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Feature

The Responsibilities of Management by Electronics By General Rawlings

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On The Cover

General Edwin W. Rawlings in 1929 began a career that brought him exactly 25 years later, to the rank of four-star general. At 49, already considered one of the outstanding business management experts the military, Rawlings became one of the U.S. Air Force's youngest full generals.

He assumed command of the Air Material Command, with headquarters [illegible] Air Force Base, [illegible].

[illegible] part of [illegible] career has been [illegible] posts, General Rawlings is a command pilot, combat observer, and aircraft observer, and has had his share of excitement in the air. He has been awarded the Distinguished Flying Cross, the Soldier's Medal, the Distinguished Service Medal, the Commendation Ribbon.

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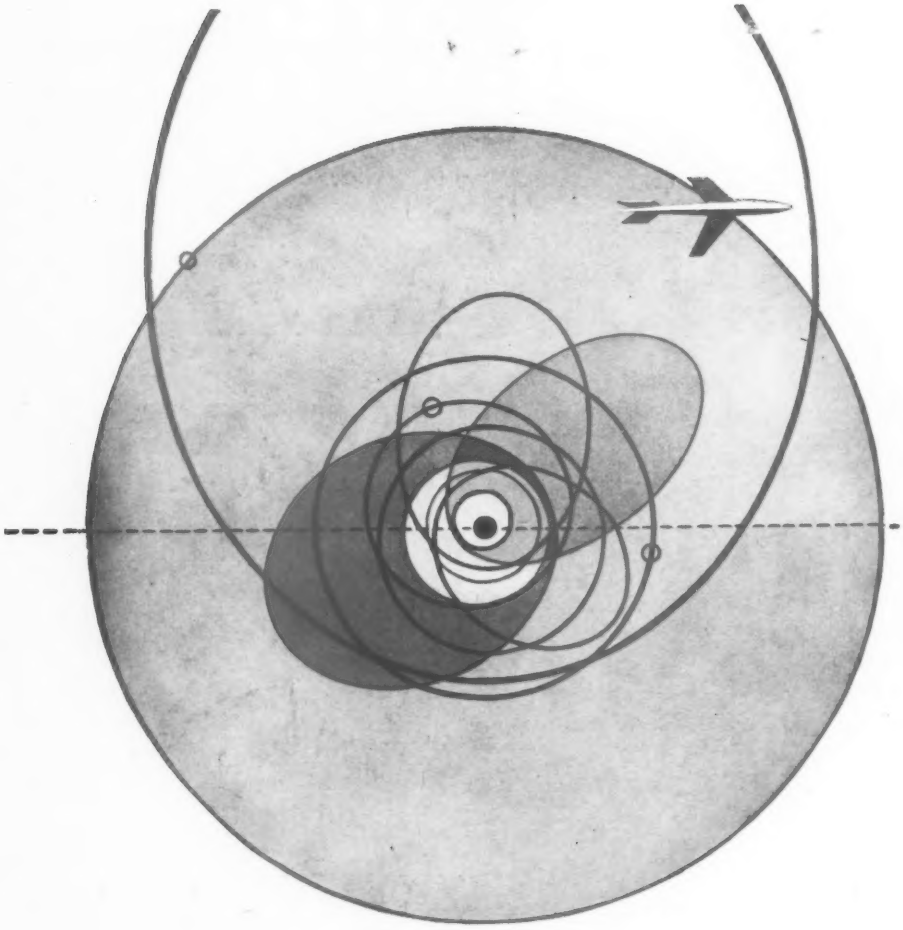

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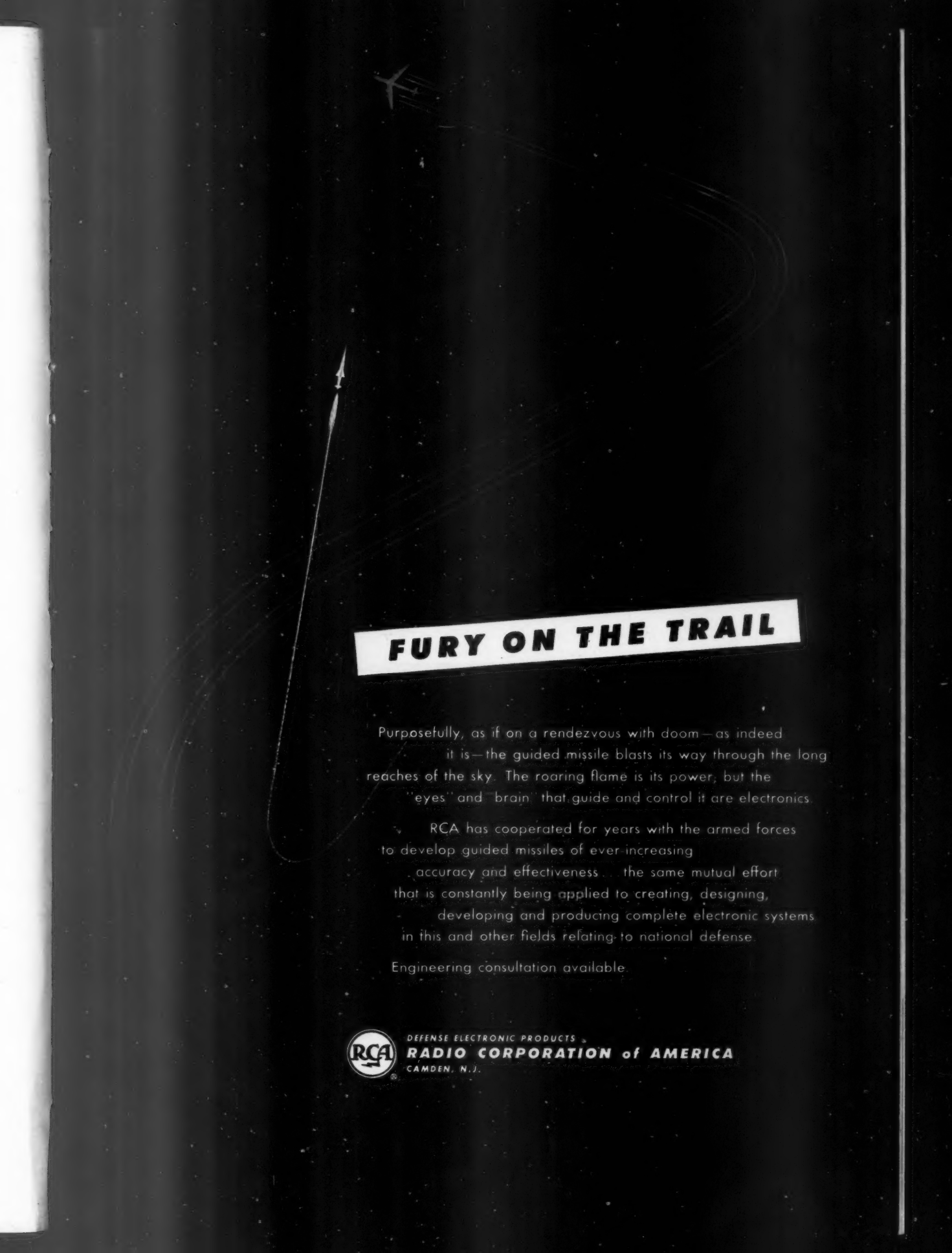
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By General E. W. Rawlings
Commander, USAF Air Materiel Command

The Responsibilities Of Management by Electronics

THE CLASSIC example of man out-maneuvered by his own scientific creation is, you will remember, Frankenstein. He made a kind of mechanical houseboy that got badly out of hand. This was probably largely because Frankenstein devoted all of his thought to the capabilities of his mechanical marvel and none to the parallel development of his own ability to direct and control it. He was an able scientist, but a very poor manager, and because he failed to grow with his monster he came to a sad end.

This simple tale has a certain cogent lesson for those of us in Armed Forces management who are bringing electronic data processing equipment into our work force.

Most of us are, or shortly will be, in that company, because the extensive use of electronic systems in Armed Forces management is a growing and necessary trend which offers many advantages for the defense mission. In support functions particularly—the logistical missions of all the services—electronic data processing equipment promises to become a major management tool. Among the multiple benefits which we may expect from the proper utilization of such equipment are increased speed, flexibility and accuracy in large scale defense logistics; optimum use of skilled manpower, always at a premium within the Defense Establishment; and a greatly increased and stabilized expansibility factor in case of emergency. Any one of these would in itself justify our best efforts to exploit the full potential of electronics in management.

Within Air Materiel Command, charged with the Air Force logistics mission, we have already passed the two-year mark in a five-year program to phase these equipments into the existing logistical system and to research and plan the development of organizational structures and operating procedures which will capitalize on the possibilities of this new moving force.

We already have two large equipments, the Sperry-Rand UNIVAC and the IBM 702 in operation within the Command. By this October AMC will be operating and performing development test work with seven large scale electronic data processing equipments. In addition there will be some fifteen smaller computers, such as IBM 650's and RAMAC's throughout the system. This equipment will perform something of a revolution in the computation of requirements, time-phasing of overhaul and procurement schedules, and inventory determinations and controls, to name only a few of the major applications on which we are already testing it.

Our apprenticeship of the past few years in electronic

management has brought home to us sharply the fact that management, no less than the work force, must make a significant re-adjustment to these new techniques. It must consciously re-evaluate its attitudes and operational principles if the transition to optimum use of these powerful tools is to be accomplished without dissipation of energy or dislocations within the job mission. With the introduction of electronic techniques a number of major management responsibilities assume a new importance.

In the first place, the top echelons of management must be responsible for generating an intensified driving power which can come only from personal conviction concerning the potential of these systems. They must believe in them and be sufficiently informed about them to give a steady and strong impetus at all levels. This drive must carry middle management by influence and operational levels by specific education.

There can be no substitute for this vital element of personal leadership, for electronic data processing is a major shift in direction. It cannot be taken for granted, pushed by the normal momentum of accumulated experience. It is a break with the past which involves changes of familiar patterns, the irritant of adjustment to something new. As such it must overcome the inertia of habit, of old, firmly established ways of doing things. To buck that inertia it must have behind it not only the full authority of top management, but—even more important—the enthusiasm and conviction of top management. It is axiomatic that the progress made toward integrating electronics into management will be directly proportional to the amount of personal thrust given the program at top directive levels. And this is a responsibility which cannot be effectively delegated by any manager who really wants electronics to work for him.

Secondly, management must consciously give a new weight to long-range focus—in establishing and maintaining the research activities essential to realize the full potentialities of these systems and make them pay their way in lowered unit costs of data processing. If we attempt indefinitely to graft the new techniques to pre-electronic processing, we are going to glean only a fraction of the harvest from this equipment. The immediate advantages of speed and accuracy which they offer when harnassed to the existing systems, can be a snare for management, tempting them to invest their total EDPD resources in their "quick payoff."

Actually the great potential of this equipment lies in its ability to condense and synthesize procedures within existing systems, to achieve radically new shortcuts to comparable or better results. Such utilization, however, can only be the outcome of intensive research and analysis, with constant experimental application of the equipment to determine what applications are and are not feasible. From the standpoint of quick amortization of initial investment in the systems, this time must be written off as a debit; but in the long view it is the only avenue to full exploitation of the real possibilities of electronic data processing equipment. Management must insure that both equipment and qualified manpower in effective quantity are consistently available for research purposes, and that this function is given the support, the sense of direction and the latitude of thought and operation to produce significant results.

Thirdly, management must get and keep its house in order organizationally during this period of transition to the new techniques. EDPD has one quality in common with bonanzas generally. At first everyone is skeptical; then everyone wants to get into the act. In large organizations, particularly, such as our defense logistical missions, the difficulty is about equally divided between getting our people to accept and use the new techniques in the first place and constructively channeling their enthusiastic acceptance once they have glimpsed the possibilities.

The proper balance of research and operational functions is at best a difficult problem requiring centralized control. On the one hand they tend to lose touch with each other, thus depriving each function of an auxiliary viewpoint and growing fund of experience which could be of genuine value. On the other hand, the more dedicated each element becomes to its EDPE mission, the hotter the competition grows for use of limited equipments. Each has sound justification in its argument for priority. Differing circumstances at different times demand a definite flexibility of the ratio of time allotted. This should be refereed through a firm, centralized control point which can weigh and synchronize the various elements in the program, prevent duplications and profitless diffusion of effort and act as a clearing house for the increasing practical experience gained on the equipment.

Moreover, electronic data processing equipment is no respecter of organizational boundaries. Its great potential is, in fact largely based upon its ability to provide a common denominator of data to all elements of an operation. It should operate as centrally and impartially as the heart of a body, receiving data from all parts of the body, processing it and making it available to all elements for withdrawal of their particular sustenance. If we are to allow effective scope for the advantages inherent in this across-the-board sweep, directive control must be centralized at a point independent of specialized organizational interests and overlooking the total mission as a complete entity.

The fourth responsibility of management must be the establishment of procedural disciplines which will insure the ability of the operating levels to learn progressively from their own experience. At the present stage of development especially, realistic and consistent procedures of feed-back to the reporting levels are a major means to a continually improving adjustment to the electronic systems. Units in the field should be regularly apprized of the degree of accuracy of the data supplied by them for processing; they should be intelligently aware of all the factors within their control which contribute to valid results; and they should at all times have a sound basis for judging their areas of deficiency and their progress toward correction. The speed of electronic data processing equipment makes timely feedback a practical possibility which it has never been

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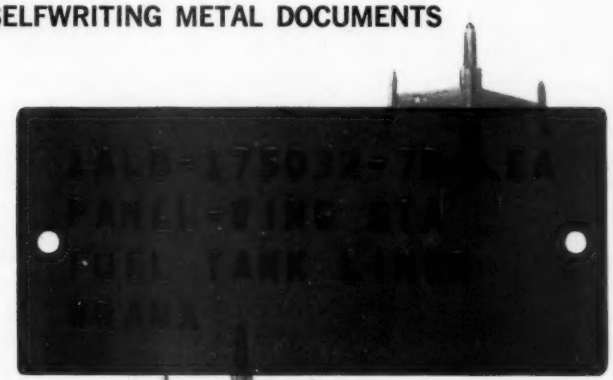

In 1951 the Air Force asked Dashew to help find a way to provide clear, accurate and durable identification for materiel in storage and in the processes of overhaul. It was found that "lost identity" was causing serious problems in the logistical system. Stencilled or paper tag identification on materiel in outside storage, in both ZI and overseas areas, became obliterated by attacks from sandstorms, hurricanes, typhoons, tornadoes, monsoons, rodents, etc. Critically needed materiel "on hand" (according to inventory records) often could not be located. In maintenance shops, identification tags on parts did not stand up under sandblasting, chemical cleaning and general rough handling. As a result, vital time and labor were frequently lost in overhaul operations because parts in process "lost" their identity.

Many Air Force managers recognized that defective identification resulted in: huge annual outlays for replacing "lost" materiel; substantial annual costs to reidentify and repackage salvage materiel. Resulting inaccurate consumption and inventory figures impaired efficient functioning of the entire logistical system.

To help solve these problems Dashew first developed, with its own resources, the now famous Dashaplate—a tough, weather and chemical resistant, color-coded, metal identification tag. Dashew next developed the Databosser—a high speed machine for embossing stock numbers, part numbers and other data on these durable tags. A pocket sized writing machine, the Datawriter 18, was then produced which accurately transcribed the embossed data from Dashaplates onto all types of forms. Indigenous personnel, regardless of their native tongue, as well as Americans with poor handwriting, could now accurately transcribe supply and maintenance data.

Vast annual savings are reported by installations now using the Dashew system through prevention of over-procurement, elimination of reinspection and repackaging, increased maintenance efficiency and more rapid activation of equipment in overhaul. Further, more accurate source data will be furnished to the electronic data processing centers.

To keep pace with the higher speeds in document and materiel handling now possible with electronic data processing equipment, Dashew recently introduced its electronic Databosser. This completely automatic machine will emboss plates directly from punched cards or tapes. Positive identification through selfwriting Dashaplates can now be secured more rapidly and at LESS DIRECT COST than by stencilling, paper tags or other conventional methods. As a further advance, substantial progress is being made toward a device that will read the information recorded from selfwriting Dashaplates directly into a data processing system.

Please send for your copy of "6 HONEST SERVING MEN," the detailed story of how Dashew can assist in improving the accuracy of present supply and maintenance programs and in laying a sound foundation of accurate source data for electronic data processing. A sound and color slide presentation of this important new concept is available, and showings may be arranged for personnel concerned with these vital problems.

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before. We can now literally strike while the iron is hot to shape our processing at all levels more sharply to our purpose.

Management's fifth responsibility is for people. A new order of creative and progressive personnel policies is absolutely essential to success in the transition to electronics. Electronic data processing equipment demands quality manpower. The right people are the true key to the right answers from the machines. Specially trained personnel, particularly in the planning and programming fields are at a premium today and will be for some time to come. Yet these are the development years when the proper people are most important for putting our programs on the right track.

In Air Materiel Command manpower has proved the greatest single limitation upon the evolution of electronic management. Our program is still today only a little more than 60% manned, in spite of extensive training programs by the equipment manufacturers, the National Bureau of Standards and, more recently, in civilian educational institutions. Competition for qualified and trained personnel is, of course, keen and will become progressively so as business and industry move toward a greater degree of automation.

We in Armed Forces management must establish a policy and definite programs for developing our own people to the greatest extent possible, utilizing every transference of skill and training which is applicable. We cannot buy this kind of manpower "off the shelf" any more than we can procure our complex weapon systems in that way today. We must actively help to create it, to mould it to our needs. Management has not before faced a comparable responsibility for hewing out its own work force.

The final demand made upon management for the successful integration of electronics is commonsense in the assessment of potentialities and progress. There has been a great deal of over-optimism concerning these systems in their introductory phase—followed by some equally hasty pessimism about their limitations. Both attitudes are unrealistic and are reflected throughout a program in erratic progress and broken momentum. These are not miracle machines, except as we are prepared to make them so by patient, informed planning, imagination, openmindedness to experiment, and the willingness to invest exploratory time, money and manpower. They will not give us all of the right answers immediately, and Armed Forces management has an urgent priority obligation to maintain "business as usual" in the form of ready-to-go national defense.

This means that we must be prepared for a period of parallel operation, of phasing in the new force gradually as we grow surer in our control of it, more experienced in its developing possibilities. We must see small daily gains in proper perspective, avoid undue discouragement over the difficulties of hybrid operations. We have lived for years with manual and punch-card systems of data processing the actual limitations of which we did not even realize until electronics caught them in the beam of its relentless accuracy and speed. In many respects the vision of our people is still circumscribed by those limitations. They have exerted a kind of gravitational force to which our operations have become conditioned. Now, somewhat like space travelers, we are thrust beyond such confines and encounter the problems of weightlessness. Acclimation cannot take place overnight. We must not let the difficulties of re-conditioning our thinking, or re-casting the approaches to the machines, warp our evaluation of the true potential of electronics.

The atmosphere in which a work mission is accomplished is an outgrowth of management's own attitudes, and it is a principal determinant of the rate of progress. Unrealistic expectations can be as blighting as indifference if they lead to daily disillusionments and eventual loss of impetus. We must recognize the necessary and complementary values of both patient persistence in operation and boldness of concept in research. Common sense in blending and blancing these elements is a prerequisite for the successful evolution of electronic management techniques.

Those, briefly, must be major objectives of management in accomplishing the transition to electronic equipments. In Air Materiel Command we realize that we are still far short of fully achieving all of them. We feel, however, that the recognition of these responsibilities is a significant product of our experience to date. It puts us on the right path for progress.

The crucial test of any management in our time is its capacity for objective overhaul of its own attitudes and responsibilities, its dynamic adaptability to change. Electronic data processing equipment is a tremendous and pervasive force for change. It is already altering the kind of work men do, the results they can achieve, the raw materials of management decisions. If we in Armed Forces management are to retain our directive power over it and handle this potent tool with true creative skill for the accomplishment of our defense mission, we must grow with it. We must consciously and systematically enlarge our own understanding of and capacity for better management through electronics.

Electronic Brain to Service Parts Needs of Naval Aircraft

The Navy demonstrated how an electronic brain is used to provide the thousands of Naval aircraft based around the globe with parts and equipment they need, when and where they need them. Members of the press watched while an IBM 702 Electronic Data Processing Machine aboard the Navy's Aviation Supply Office went through its paces at incredible speeds, automatically helping to see that jet fighters patrolling anywhere have what it takes to keep them in top condition at a minimum cost to the taxpayer.

Rear Admiral Frederick L. Hetter, commanding officer of ASO, told the attending group:

"The supersonic age in aviation has led to electronification of our supply procedures. The support of the complex jet aircraft the Navy has deployed throughout the free world today presents the Navy's supply personnel with procurement and distribution problems which cannot be properly solved without highly automated data processing systems."

STEPPING OUT...INTO SPACE!

In the eerie light on the threshold of space an Air Force technician "bails out" of a gondola — *seventeen miles up!* His rate of descent will reach 450 miles an hour before he reaches thicker air where he can safely open his chute. On the ground far below, highly trained specialists are checking a maze of electronic equipment that will record every phase of this operation. It is important that key men involved in such experimental projects be moved to new assignments without delay. That's why they're flown by the speedy, dependable Scheduled Airlines. Next time you're moving one man or many, call your Scheduled Airlines representative — let him show you how to save transportation money and keep your men **ON THE JOB** . . . not "on the way."

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Management Principles Of the Union Oil Company

By REESE H. TAYLOR, president

THE MAIN objective of a business is to make a profit, just as the main objective of the Armed Forces is defense. *How* these main objectives are approached makes the difference between failure or success, between being a social and economic burden to the American community or benefiting it through daily operations. In general, it seems that either group can accomplish this objective only by adhering to some well-defined principles.

Some of the principles adopted by our company are quite generally found in modern industry. Others we believe are as yet less universally adhered to. The purpose of this article is to spell out our more important principles of management, both the conventional ones and those we think are more unique and more progressive. Briefly and mostly by implication we will relate these principles to similar, though naturally not quite comparable, policies of the Armed Forces.

Principles and Policies

In the paragraphs which follow, the word "principle" is used to mean a governing rule of conduct, while "policy" is the course adopted to transform the principles into procedures and techniques and thence into action. But notwithstanding finer points of definition or of theory, both "principle" and "policy" as we understand the terms at Union Oil are simply common sense expressions of the golden rule as applied to business problems. They are not weasel-worded platitudes which sound good when thundered at a captive dinner group yet are so cunningly devised they can be twisted several ways to fit a moment's whim.

Over the years we made a real effort to establish our principles and policies, not an easy task and one which never is quite finished. But we've made sufficient progress so that our people now have guides for action in most important areas of their daily work. These guides or principles are definite enough to unify the individual efforts of hundreds of key people and channel them toward a common goal. Yet we feel that our people have sufficient leeway permitting and encouraging them to fit decisions to the jobs they do as part of their daily tasks. We try to keep reality of operations as close to theory of principles as possible—and experience has shown us that the two need never be too far or long apart.

Broadly speaking, a company's management can choose among two sets of principles. It can operate on the premise that its first responsibility is today's results, and that tomorrow's share owners, tomorrow's employees, and tomorrow's management can worry about tomorrow. Or it can operate on the premise that the company is a going concern entrusted to management which it in turn is morally bound to transmit intact or preferably improved to the next generation.

At Union Oil Company we chose the second set of principles. Accordingly, we plan and spend and work a lot for future years without always insisting on immediate large dollar profits – provided we are satisfied an earnings potential is created by our actions.

"What's Good for the Company . . ."

We have done a lot of thinking about the familiar saying which goes somewhat like this: "What's good for business is good for the country." By and large, we know this to be true—a look at America's dynamic economy yields a million proofs of it. But we have never allowed ourselves to think that this community of interests is automatic, that it is something which just happens in the case of our or any other company if we merely work toward profits. We therefore moved to fit our goals to the goals of the country as a whole. A good example of applying this principle practically to our daily operations is our leading position in employee benefits, pioneered some years before the public became vocal about its needs in individual and social security.

We long knew that providing security of various kinds for our employees is good for the country. We also knew that it helps us to keep good employees—and to keep them happy. But from formulating the principle here involved—a desire to provide economic security in relation to length and extent of Company service—to building each part of our complex benefit program into a harmonious fit with the federal and state social security pattern and other Company objectives was no small distance.

Planning took years. The first part of our benefits program, a group life insurance policy, was

offered to employees before World War I; by now, benefits cover employees and their families under virtually any condition and emergency, service-connected or not, during employment and after retirement. We are proud that available coverage is the most liberal and comprehensive of any company our size, and that in virtually every case we were first in our industry or in our area to offer the various benefits.

Even more important to us than the pioneering aspect or the completeness of our employee benefit program is the principle which the program exemplifies of respect for employees as individuals. We don't regard our people as money-making tools to be used while good and discarded when damaged or too old. Rather, we respect our people as people, as individual men and women with needs and wants and ambitions—and perhaps with weaknesses. So, having aligned our Company's solution with the generally recognized national problem of social security, we feel that in the area of employee benefits we can say, "What's good for Union Oil is good for the country."

Mentioned last, but by no means incidentally, is another of our management principles in the area of employee relations: To pay each man fair wages rather than the lowest competitively possible compensation; to give consistent fair treatment rather than uncertain favoritism; human consideration rather than paternalism; opportunity rather than regimentation—and do all this whether or not it happens to foster immediate profits, and whether or not at any time it is popularly thought to be "the thing to do."

Line and Staff

The Union Oil Company is organized on the line and staff principle.

In our line organization we have adopted certain basic principles. We try to have no more than seven echelons between the lowest man and the president. We also try to have no more than eight people reporting directly to one supervisor, except when strictly routine, repetitive tasks make it possible for more employees to report directly to a single head. We also try to give our men enough real authority and information to make decisions which are routine at their level. Thus action at that level needn't be delayed while men at higher levels waste their energies and time with lower-level problems or decisions.

Union Oil's staff functions are of three main types. First, we have the routine housekeeping functions such as purchasing, accounting, or employee relations. Second, control people evaluate and watch routine staff and line performance and suggest improvements as required. And third, a group of people does what might be called "pure thinking." They ponder and attempt to solve problems outside the immediate scope of our existing operations, such as geographic, financial or product expansion. They do their job alone, or ask for help from outside part-time consultants. The people in the group last mentioned try to recognize and tackle Company problems looming too far in the future to seem of quick concern.

Staff work, especially of the first two types described, is often handled by line people, particularly by line managers. Generally the three types of staff functions are not rigidly departmentalized; particularly on higher levels, one person may perform jobs in all three categories and on occasion even handle line assignments too.

Decentralization

The oil business is logically divisible for management purposes in four principal functions, plus those which are common to all businesses such as purchasing and accounting. The four are: Exploration and production, transportation, manufacturing, and marketing.

Over the years we have found that we fare better by allowing each major operating division to make its own decisions. Our pertinent management principle is to decentralize, i.e., to make decisions as far down the line as possible without losing central control over results.

This principle and its implementing policies entail some obvious benefits as well as some not quite as quickly visible but not therefore of less importance. Making decisions close to the problem which needs action or solution usually saves time which is precious in competitive situations. Also, the people making the decision know more about the problem, and their decision tends to be at least as good as if it originated higher up, provided over-all Company principles and policies are known and understood. This proviso is of course a most important one, and as discussed below we spend much care on building and perfecting our intra Company communication. A quick decision also usually makes a happier customer or supplier than would one which plods its bureaucratic way up and down through half a dozen echelons of management.

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We are pleased to announce that a limited number of the JANUARY, FEBRUARY, MARCH, APRIL, MAY, and JUNE, issues of ARMED FORCES MANAGEMENT, which will bring you the complete series of Colonel Leland B. Kuhre's "ORGANIZATION—From Empiricism to Principle", are available postpaid for one dollar. Believing this to be the answer to the many requests received for back issues, the complete series of six installments packaged to preserve continuity, will be forwarded upon receipt of your order. A dollar bill addressed ARMED FORCES MANAGEMENT LIBRARY, 208 South Second Street, Rockford, Illinois, will bring you this much discussed and controversial feature. Those individuals and organizations who have already requested the complete series need not duplicate orders.

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The F-104 *Starfighter,* now in production for the U. S. Air Force, is the most advanced airplane of its type ever developed. *Dimensions:* height, 13 feet, 6 inches; length, 54 feet, 9 inches. *Wings:* knife-sharp, and only 7½ feet from fuselage to wingtip. *Engine:* General Electric J79, which develops more thrust per pound of engine weight than any other turbojet of comparable size. *Electronics system:* new "plug-in" type, to permit quick changes and replacements of components. *Pilot's seat:* downward firing ejection type, the first in a production jet fighter. *High, T-shaped floating tail:* twice as effective in controllability as conventional tail designs. *Armament and top speed:* both are military secrets, but the Lockheed F-104 can overtake and destroy any plane—of any size—known today.

The *Starfighter's* dart-like configuration, perfected by extensive wind-tunnel tests, permits the F-104 to flash through the sonic barrier, routinely, without a tremor. And even at supersonic speeds the *Starfighter* has unmatched ease and decisiveness of control—because never before have so many advanced design and engineering features been so superbly combined in one aircraft.

Like all Lockheed-built planes, the *Starfighter* has inherent "design flexibility" that makes it readily adaptable to a variety of military requirements—at lowest cost to our government.

Lockheed's leadership in the design and production of military planes, of nine widely different types, stems from its policy of close cooperation with the armed services. In the F-104 *Starfighter* the U. S. Air Force has the world's fastest and deadliest jet—America's "Missile With a Man in It."

Lockheed

AIRCRAFT CORPORATION

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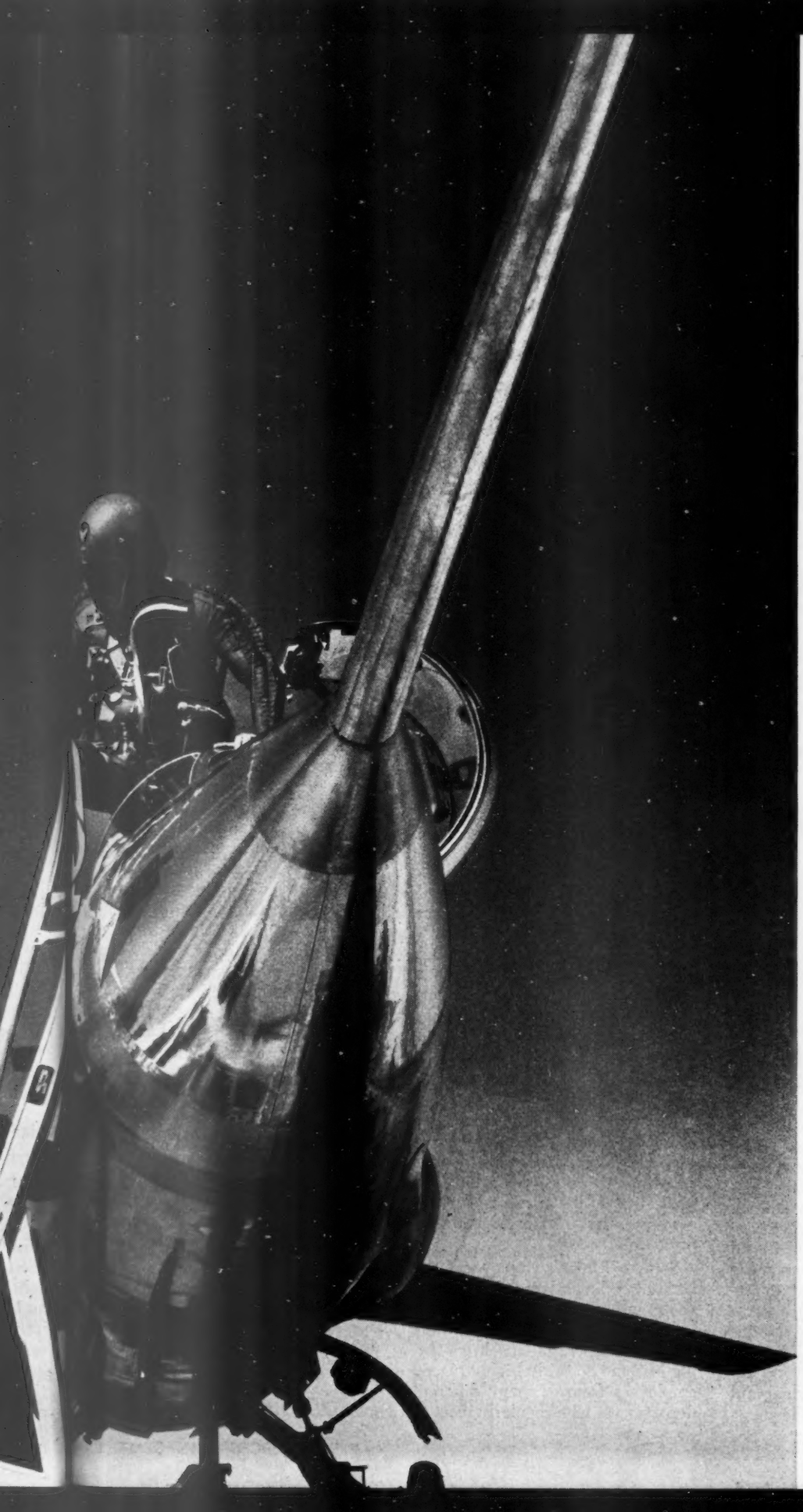
Georgia Division, Marietta, Ga.
Missile Systems Division, Van Nuys, Palo Alto and Sunnyvale, Calif.
Lockheed Air Terminal, Burbank, Calif.
Lockheed Aircraft Service, Ontario, Calif.

LOOK TO LOCKHEED FOR JET LEADERSHIP, TOO



LOCKHEED'S NEWS COLUMN

Dick Tracy has lost his lead *in the electronics race. His wrist radio is surpassed by a new "miniaturized" TV camera. Small enough to fit into a vest pocket, its "eye" is about the size of a cigarette. Built by Lockheed for research ONLY . . . (so far) . . .*

Missile Mail is promised in the foreseeable future as a civilian development of missile technology. A Lockheed official says that the thousands of scientific and technical people now researching the whole environment of man in connection with missile development will produce civilian benefits beyond the imagination of the layman today. A letter by missile, of course, would get there faster than you could write the letter in the first place . . .

A Lockheed Man is working quietly in a sanctuary abroad on a nuclear engine design that will make headlines world-wide when they take the wraps off. Same man's blueprints on a nuclear contraption so startled top military authorities very early in the nation's atomic program that they locked his patent in a government vault where, for security reasons, it still remains . . .

Lockheed has been handed *a big piece of the much-talked-about ICBMissile that will keep its Missile Systems Division scientists working nights in their new facility near Stanford University — which, incidentally,* **tripled** *in size between blueprints and ground breaking . . .*

Beating the heat which tops 250 degrees Fahrenheit at twice the speed of sound is a matter of concern now to engineers of Lockheed's California Division who are working on methods of making airplane skin glass-smooth. Even modern, high-strength dural surfaces approach their temperature limits at these speeds . . .

Early America makes atomic history this month as Lockheed Georgia Division breaks ground for its new atom-powered plane facility. The 10,000-acre North Georgia site was in the same family ever since the area opened for settlement in the 1840's.

More intangibly, we feel that decentralized management does two things for our Company. First, it trains people in junior and middle management for positions of more or higher responsibility. The supervisors of these people get a chance to evaluate their judgment and performance, permitting them to recommend promotions or to help those who have deficiencies to overcome them.

Second, we believe that in the long run a controlled amount of competition among the several departments of our Company is most beneficial. It goes without saying that any such intra Company competition must be carefully controlled to serve the business rather than to wreck it.

At Union Oil we think we've found a healthy balance between centralized direction and departmental autonomy. The budget is a significant controlled tool. Operating people have an ample voice in its making. They and top management regularly compare the budget with actual performance of production, sales or costs. Another controlled tool is a device of communication rather than a quantitative yardstick. It consists of monthly letters, addressed to the president and also mailed to all directors of the Company, reciting in considerable detail all significant activities, problems and achievements of each department. The twofold check on our departmental activities through budget-performance comparisons and through monthly letters prepared by the department heads, insures that all departments keep the over-all Company weal before them at all times.

Communication

Every big organization has a communication problem. The Union Oil Company is no exception. This problem requires constant study and experimentation. At present, our two-way flow of information appears adequate for all our current needs, but we continue to devote a lot of thought to improvements. As is typical where people are involved, two systems for transmitting information exist at Union Oil—a formal one and another one that's more informal and personal but no less useful.

The apex of our formal communication system is the Senior Advisory Committee composed of officers and key employees of all Company departments. The members of this group, besides discharging their advisory duties, inform each other of major past and planned future actions in their departments, outside developments which may tend to influence our plans or operations, and any other matters of general Company interest.

Key men in all departments meet frequently and regularly. When a department's scope reaches beyond its own people as is the case with Industrial Relations, for example, representatives from other departments regularly sit in on these meetings and have voice and vote in the decisions made.

Copies of committee meeting minutes, complete or edited as necessary, are circulated to all whose work such committee action or reports are likely to affect.

Frequent organization and procedures bulletins go to all officers and department heads. These bulletins are almost always posted for all employees to note. A four-page monthly letter from the president goes to every employee, at his *home*, to inform him of general Company and oil industry news and developments and to bring four statistical benchmarks on how the Company is doing this year compared to last year. All employees also receive a colorful monthly magazine with feature stories on our physical operations, employee benefit plans, general and oil industry economics, a summary of Company developments by departments, and recognition of significant individual achievements and events in employees' lives.

Informal communications are effected through direct contact of each supervisor with his people, and through occasional group sessions within departments for the specific purpose of exchanging information.

Some of Union's employees have associated themselves voluntarily in study groups which meet on the men's own time. Several of these groups are operating, each consisting of some 25 fairly highly placed employees from as many different departments who regularly meet to share information on their departments' scope, activities and procedures.

Training for Management

We strongly believe that our Company can be no better than its employees. We also believe that a corporation as such cannot develop men for leadership; the burden of the task forever stays the individuals. We have, however, found it most essential to create and maintain a climate in which our men feel free to reach toward their ambitions.

We try to help them to advance themselves in a professional and technical sense and in ability to perform work. At the same time, and we believe this to be even more important, we encourage them to delegate their duties of "doing work" and to acquire in addition skills in guiding people, co-ordinating their actions, motivating them to do an even better job and inspire them with loyalty to their Company, its goals and ways of doing business.

We don't believe it's possible to change a specialist into a well-rounded man by simply teaching him a few additional special skills. We therefore have a program of planned job rotation at all levels. We have formal supervisory training programs in many departments. Occasionally we underwrite a formal course of full time study at one of the graduate business schools, such as Harvard or Stanford. Personal coaching by supervisors completes the listing of main methods used at Union Oil to approach our goal of optimum development of each man's full potential.

Our executive development program is a long term project. We have worked at it for years at various levels and, while we know we can't relax our efforts, we nearly always up to now have had good men prepared and ready to move up when key positions became vacant through retirements or due to expansion.

Public Relations

We at Union Oil believe that public relations must be lived to be effective. We cannot overstep the bounds of law nor shirk our moral responsibilities to society and

still expect our customers to trade with us. We have, therefore, built compliance with both legal and accepted moral codes right into our daily tasks. Press agentry and flamboyant publicity stunts are not for us. Our public relations staff is among the smallest of any company of comparable size, and yet we have reason to believe that Union Oil's acceptance as petroleum supplier and industrial citizen is highly satisfactory.

Industrial Citizenship

Industry lives and prospers because people buy its products. And people, especially those living in the plant community, are likely to prefer buying from that company which, within any one industrial group, builds up the highest social assets or incurs the least social liabilities. Under the heading of social assets we would list active participation in community fund raising drives, support of schools and colleges, loans of employees to government and civic projects, safe-driving schools and others. We encourage our employees to participate in civic and community activities. Social liabilities, on the other hand, include such things as industrial injuries (whether financially compensated for or not), emission of waste into the air or water, unfair treatment of suppliers or retailers, and similar acts. Briefly, we are for any program which benefits the community or any significant group of its citizens and is consistent with the long-range interests of the Company's share owners.

Planning for the Future

The Union Oil Company owns certain visible assets, and others which can't as readily be seen as is the case with underground petroleum reserves. In the course of fulfilling our economic and social functions, we are using up these assets. Therefore management believes sincerely that among its foremost duties is the passing on intact or better still, improved, the economic aggregate which today makes up the Company to future generations.

Accordingly, our men continually replace and enlarge the Company's assets. Partly this is done by plowing back earnings and investing them in assets similar to those we already own. In larger measure the improvement we seek is one of value as distinguished from mere volume, and even more important we try for an increase in quality of what we have and what we make. The achievement of these goals involves upgrading of our assets, such as that which will be brought about by raising the average degree of gravity of our crude oil reserves, or by improving our refineries so they can turn out more high-value products.

Much of our technical research is also oriented toward the goal of bettering the future value of our assets. Methods to convert crude oil costing, say, $3.00 a barrel into chemicals worth $30.00 a barrel, provided the conversion cost is not excessive, has the same effect or perhaps an even more desirable effect as has a mere increase in barrel volume of the oil reserves which we own underground.

Our planning for the future has taken us deeply into shale oil pioneering and research. Against the day when finding costs of new crude oil will be too high, we've searched for methods to draw low-cost fuel value from the country's fabulous oil shale reserves. Conservatively estimated at fifteen times the now known crude reserves, shale oil reserves have not so far been economically convertible into liquid fuels. But the gap in price between crude and shale oil is now closing, in measurable degree because of development work done since the early 1920's by Union Oil people who even then foresaw that crude oil exploration costs would someday rise too high and would invite fuel competition from new sources.

Our forecasts of future needs of motorists and motors have enabled us to complete refinery units designed for ever higher grades of products in time to keep a quality lead over our competitors.

Quality Emphasis

Our objective of maximizing long-term earnings can be reached by several avenues. Shooting for high volume would be one such avenue. A comparison could be drawn—admittedly imperfect—with an assumed strategy of the Armed Forces. Given the task to take a strong point it could be attempted with many men and average equipment, or with few men and strong, effective weapons. We have chosen the second methods, and while not neglecting promising alternatives in special situations, strongly emphasize premium quality in our services and products. We don't aim to be the biggest, but the best.

This basic principle shapes many of our actions. It calls for more research, and more imaginative research. It calls for modern refineries capable of converting raw materials into high unit value products. It demands the cleanest and most attractive retail outlets, and accordingly it sometimes entails a higher unit retail price for our products.

Union Oil's quality reputation has built for us a loyal following of customers—of people who want the best and can depend on getting it from us.

Free Enterprise System

We are convinced that our Am-

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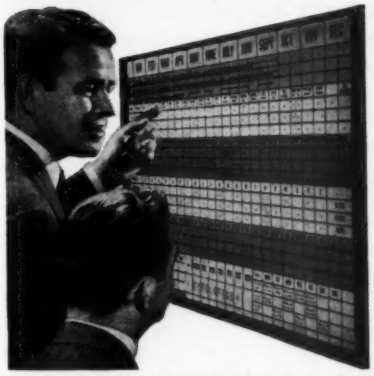

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erican system of free enterprise is better able than any other system known today to create, maintain and improve our standard of living. We are also convinced, however, that the relationship between free enterprise and a high standard of living is not as well or as generally understood as might be desired, from the viewpoint of preserving that system for the future. Accordingly, for some years it has been our principle to promote an understanding of the American economic scene among our employees and the general public.

While the techniques we use to approach this goal are designed to promote free enterprise at the same time that they promote the Company, their primary purpose is to encourage a better understanding and appreciation of our American way of life.

Not the Biggest, but the Best

The foregoing review of the management principles of the Union Oil Company must be incomplete and sketchy if it is to stay within the space allotted. But we can suggest what our other principles are which are not here mentioned or described. They all fit into our scheme of working toward the goal of greatest economic and social gain of all the groups we are in contact with – share owners, customers, employees, the community, government. In choosing methods to achieve our goals, we choose the ones we think will bring about the greatest total benefit, and try to stay away from those which yield advantages today at the expense of the future.

The Union Oil Company doesn't aim to be the biggest, but we do want to be and stay the best–in the best sense of the term.

USAF Driver-Training Program Gets Dodge Aid

The United States Air Force program to make good drivers out of good flyers got a boost recently from Dodge.

Byron J. Nichols, vice president in charge of sales, notified all of the company's dealers that Dodge will issue a check for $125 for each new vehicle that a dealer loans to the Air Force for use in the huge driver education program. The money is to offset any cost that the dealer may incur in removing dual controls and reconditioning the car for re-sale after its return.

The $125 allowance to dealers participating in the Air Force program is an extension of Dodge's regular plan of encouragement to dealers who provide cars for high school driver-training. The Air Force is receiving assistance from the AAA and its affiliated clubs in organizing its program.

Nichols told Dodge dealers that the company's participation in the program begins with 1956 models and will run until further notice.

"Dealers who identify themselves with such programs–through the loan of automobiles to be used in behind - the - wheel instruction–report that they are amply rewarded in community respect," Nichols said.

Ryan to Build "Vertiplane" For Army Under Naval Research Contract

A new type aircraft called the "Vertiplane" which looks like a conventional light plane yet will be able to take off straight up and land without any ground run, will be built for the Army by the Ryan Aeronautical Company, T. Claude Ryan, president, announced recently. The contract will be administered for the Army by the Office of Naval Research.

That Ryan was developing a new VTOL-type plane has been known in the industry since early last year when it was disclosed that the San Diego company had applied to the U.S. Patent Office for registration of the Vertiplane trade mark.

The new plane will be in distinct contrast to Ryan's other vertical takeoff aircraft, the all-jet delta wing fighter type research plane, the Vertijet, being developed for the U.S. Air Force. Ryan's Vertiplane type is best adapted to medium speed liaison, light passenger and cargo transportation, while the Vertijet is more adaptable to high performance combat missions.

The new craft will achieve vertical takeoff and landing by employing the deflected slipstream principle, using large propellers and double, retractable wing flaps which extend far below and to the rear of the wing trailing edge.

The Ryan Vertiplane will be capable of the same flight maneuvers now associated with helicopters, yet possess performance exceeding rotary winged aircraft in speed, range, altitude and endurance. Conventional in appearance and fuselage attitude, the plane will be a true VTOL aircraft designed to take off and land with no ground run. It will hover, make full transition from vertical to horizontal flight and fly forward, backward and sideways.

The new deflected slipstream aircraft will embody a conventional configuration with the exception that the wing incorporates large flaps located in such a way that the propeller slipstream can be deflected 90 degrees downward during takeoff, hovering and landing. For transition into horizontal flight, the flaps will retract as the plane picks up forward speed and the slipstream then will flow horizontally.

In landing, the pilot will make an approach under power with some flap deflection. Then, he will extend the flaps and add power until the touchdown is made at zero forward speed. The drag resulting from the use of partial flaps helps accomplish a smooth landing transition at almost a constant level altitude for the aircraft.

With this new contract the Army is capitalizing on the research work accomplished by Ryan, the Air Branch of the Office of Naval Research and the National Advisory Committee for Aeronautics in advancing the state-of-the-art of deflected slipstream knowledge to the point where a research airplane can be built. Prior to the award of the present contract, Ryan completed the first tests and studies of deflected slipstream principles made with full-scale equipment for the Office of Naval Research.

At the A. B. Dick Company's new Niles, Ill. plant each of the 1500 employees gets a birthday card annually, delivered by his foreman. The card invites him to a meal in the cafeteria as the company's guest.

What Management Means to Me—

This Month:

By Colonel Phyllis D. S. Gray
Director, Women in the Air Force

The management of Women in the Air Force (WAF) derives from four broad concepts: (1) that the peacetime component will be comprised of approximately 9000 carefully selected volunteers; (2) that these women (airmen and officers) will be assigned to military jobs only; (3) that the majority will be utilized in career fields where women make their best contribution to the Air Force mission, that is, in Administration, Personnel, Supply, Medical, Communications, Comptroller, Aircraft Control and Warning, Air Passenger Transportation, et cetera; and (4) that, for the purpose of studying optimum utilization, a minority will be assigned in fields less traditional for women, such as Meterology, Radio/Radar Systems, Research and Development, Electronic Instrument Trainer, Parachute Rigging, Photomapping, and Intelligence Operations.

The last two concepts—(3) and (4) above—guide us in developing our skills pattern for wartime expansion. All four concepts are basic to yet another, that of furthering public understanding of the servicewoman's role in view of the manworker shortage likely to develop during a national emergency. The foregoing might be termed policy-centered management.

In connection with optimum utilization, certain legal, physical, and sociological restrictions must be kept in mind. For example, by current Congressional law women are not draftable nor can they be assigned to combat air crews. Also, their lesser physical strength, as compared with that of men, limits their utilization. The average woman has 33% less strength per body weight than does the average man; she is five inches shorter; she has 30% fewer red blood corpuscles, smaller lungs, and a faster heartbeat—all of which contribute to fatigue. As it is obviously uneconomical to employ two women on a job that one man can do, WAF are not used for heavy duty. Only in wartime would this two-for-one ratio be resorted to and then only if automation or a shred-out were impractical. In Air Force parlance, shred-out means the refining or separating of an operation into its component parts, such as separating the task of lifting weighty equipment from the task of repairing it at a bench. The total operation might be maintenance of an aerial camera; women could cope with the bench repair part of the job. This brief mention of heavy duty will serve to introduce the next topic, sociological restrictions, inasmuch as both are related.

In our culture, brains are held in higher esteem than brawn. Further, in our culture, certain kinds of work are not considered socially suitable for women. Hazardous jobs and grease monkey jobs are instances in point. Among specific examples from Air Force occupational areas are Fire-fighting, Armament Systems, Air/sea Rescue, Aircraft Engine Maintenance, Construction, Outside Wire Maintenance, and the like. These represent the types of duties closed to WAF.

After applying the above restrictions we find, surprisingly enough, that 75% of the airmen occupational specialties (or about 450 different skill classifications) can be recommended for and are available to our enlisted women, and that 80% of the officer specialties are advocated for commissioned women. This latter percentage does not include chaplains, nurses, doctors and dentists, who are corps rather than line officers. The recommended career fields for both enlisted and commissioned WAF fall primarily within the support category.

To turn now from policy-centered management to person-centered management—or how women as individuals can best be managed within the Air Force structure—we find that the principles effective with male workers are equally effective with women. Selecting the right person for the right job, giving proper training and supervision, improving the working environment when necessary (both the physical environment and co-worker relationships), being generous with praise when deserved, rewarding efficiency through a fair promotion system—all these apply to both men and women and have been discussed many times. The management differences that do exist are of degree, not of kind.

World War II research revealed that the servicewoman is more sensitive to punishment and more responsive to praise than is the serviceman. This will surprise no one. Experienced supervisors know that reprimanding a woman worker is likely to bring on tears. If the reprimand is necessary, the wise supervisor will keep a box of Kleenex handy. He also knows that appreciation, sincerely expressed, will motivate a woman to do her very best; and so he looks for something in her job performance, her attitude, or her behavior that he can honestly commend. In addition, and because our WAF are a miniscule minority in a male world (less than 1% of Air Force strength), they need assurance that they "belong"; they also need reassurance that they are living up to expectations. Research findings point to the fact that, as a group, they want to do well.

The greater sensitivity of women leads them to personalize their jobs. A job becomes *my* job. A government-owned typewriter becomes *my* typewriter; the boss becomes *my* Captain. Further, we find that WAF, being volunteers in the true sense of the word, expect to be used to their full capabilities—not to be busy with busy-ness but to be busy with significant-ness. (In an all-WAF survey conducted in 1955, improvement in

assignments topped the list of most needed changes). Sometimes a job is so removed from the main mission that it seems futile. When this happens, the conscientious supervisor will explain the tie-in between the small step and the big race. If he cannot do this, the need for the job is questionable.

Thus far the supervisor or manager has been referred to as *he* because most are males. Before discussing the female supervisor in particular, a quotation from a recent questionnaire seems in order: Of about 4500 men and women office workers who stated a preference for a man or woman manager, "97% voted in favor of men".* Other opinions from the same questionnaire that are pertinent here are: Managerial skill was rated as the boss's most important requirement; injustice, a superior attitude, untruthfulness, and putting things off were listed as the least desirable traits; and fairness was considered more important by women than by men. The younger workers, the age group to which the large majority of our enlisted WAF belong, said that (1) they didn't like to work under pressure (Schedule the workload—don't put things off); (2) objected to grouchiness (This makes women feel uncomfortable and insecure); and (3) appreciated "understanding" (women's sensitivity again).

*Supervisor's Personnel Newsletter, Bureau of Business Practices, 13 Feb. 1956.

And now a brief comment on the woman supervisor. The good ones know and accept the fact that they have certain handicaps to overcome, the fundamental one being the traditionally dependent role of women. This is still firmly fixed in the race mind in spite of the fact that more than twenty million American women are gainfully employed. Thus the woman-in-charge, in addition to the attributes required of her male counterpart, must have an especially thorough knowledge of the operation so that her subordinates will have confidence in her. (In the working situation, the subordinates become the dependents.) However, she must never flaunt her knowledge or her authority. A quiet self-assurance, coupled with a high degree of diplomacy, are her primary personal requisites. It may be of interest to note here that 88% of our women officers are in managerial assignments, and that almost all of them are in charge of both men and women. Through experience the best of them have learned to professionalize their working relationships.

The writer of this article realizes that nothing new appears here. The generalizations that have been made above have been made many times before. However, because most of the information on *How to Supervise Women* has been empirically arrived at, the writer hopes that this subject will be given serious attention by qualified researchers.

Mexican Leaders Visit Washington to Study American Business Methods at GEICO

Under the auspices of the International Cooperation Administration, the Mexican Office Management and Administration Project has sent a team of business leaders to the United States to study the latest American business methods.

Composed of 15 top representatives of Mexican industry, labor, banking, education, and government, the group will undertake an intensive five-week study-tour of their American counterparts. Washington, Baltimore, New York and other of our key cities are included in the broad itinerary.

While in Washington, the only private enterprise visited was Government Employees Insurance Companies. A discussion of work measurement was held, as well as a study of the use of electronic business equipment. With the largest private installation of electronic business equipment in Washington, Government Employees Insurance Companies served as an outstanding example of how automation functions in the American Business world today.

Ultrasonic "Bath" Will Clean Radio Parts and Chassis

An ultrasonic "bubble bath" method of cleaning intricate electronic assemblies such as radio parts and chassis has been perfected by the Navy.

Tests made at the same time the ultrasonic units were installed for cleaning small precision parts, such as bearings and generator parts, revealed that complex electronic circuitry in radio, radar, Link trainers and test equipment now can be cleaned by the same "bubble bath" of high-frequency sound—almost instantly and without disassembly, according to an article in Aviation Age.

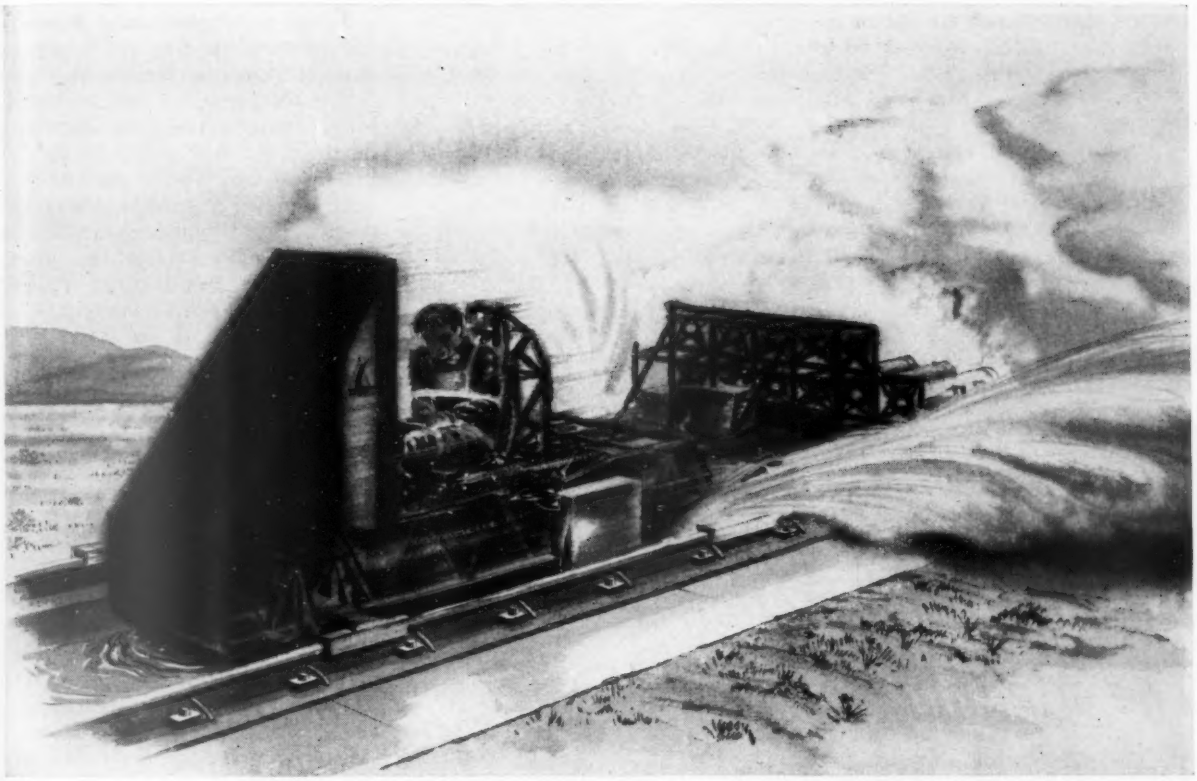
The Navy is installing two of the Ultrasonic units, developed by the Pioneer-Central division of Bendix Aviation Corporation, at each of its nine aviation overhaul and maintenance bases in the United States, it was disclosed.

The same article also reported that Trans World Airlines, Inc., had saved $11,154 over a six-month period by the installation of ultrasonic units for the cleaning of generator armatures.

The magazine also reported that even intricate teletypwriter assemblies—which normally have to be disassembled for cleaning—were bathed in an ultrasonic unit for two minutes with excellent results.

It revealed that ultrasonics, which uses high-frequency sound waves transmitted through a cleaning solution to blast loose minute particles of dirt, dust, carbon, grease, and other foreign particles, is much more economical and efficient than normal cleaning methods.

The ultrasonic technique is especially suitable for cleaning hard-to-reach crevices and blind holes of aircraft components.



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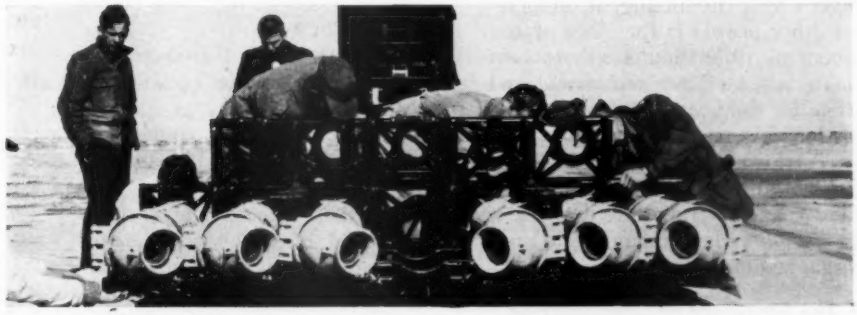
The high degree of safety and reliability of Aerojet-General solid-propellant rocket powerplants has been demonstrated by their repeated use on manned test sleds. Shown here is the Northrop sled which received widespread attention during deceleration tests conducted at Holloman Air Development Center, with Lt. Col. John P. Stapp, USAF, subjecting himself to deceleration rates up to 35 G's!

Power for the sled comes from six 5KS-4500 Aerojet-General JATOs, providing 4500 pounds thrust each for five seconds. Actually developed and produced for assisted-takeoff of heavy carrier-based aircraft, the use of the 5KS-4500 on the Northrop sled typifies the variety of applications for which the many existing types of Aerojet-General JATOs may be used.



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MORE POWFR FOR AIR POWER

By C. G. Abrams, Jr.
Head, Management Branch (Ada)
Administrative Division
Bureau of Ordnance, Navy Dept.

Human Organization— The Meaning of Management

THIS is a discussion of how the mission and functions of management result in the structural organization, how it affects staffing, and the inter-play of these which eventually leads to the *human organization*. This is what management means to me – the HUMAN ORGANIZATION. The word "Management" itself, means many things to many people. In order to arrive at a commonality of thinking let us define management.

We like to think that good management is the intelligent direction of other *people* in the efficient and economic utilization of *men*, money, materials, facilities, equipment and time for the accomplishment of the assigned mission.

To this should be added the intelligent use of communication—up, down, and laterally. Here again, it is *people* who communicate, not organizations.

The Structure of Organization

Any group of people whose actions are integrated toward a definite purpose constitutes organization. Most organizations of large size and serious purpose tend toward a division of the work of the organization. The work, of course, must be divided according to its nature, and is assigned to those members of the organization especially fitted through skill, experience or education to perform that work.

Complementing this necessary specialization of functions is another organizational device; that of hierarchy. By hierarchy, we mean the body of officials disposed or arranged in ranks or order, each subordinate to the one above. Most organizations of any size are hierarchical for many reasons. Three of the most important of these are:

The necessity to minimize points of responsibility;

The desirability of recognizing and rewarding superior accomplishment and ability; and

The necessity for control of groups of people of manageable size.

From these precepts of specialization and hierarchy come many of the problems which confront all organizations regardless of purpose. The absolute requirement for coordination, the relation of line and staff, decentralization vs. centralization, delegation of authority, and span of control are some of these problems. Interwoven throughout these tenets, are the problems of the *human organization*, with which we will deal later on.

Types of Organization. Among the various types of organization structure, such as functional, type or product, geographical or territorial location, customer, process, or time, we will deal only with functional, and type or product organizations. For general purposes, the functional type organization is felt to be more efficient, economical, and effective because of the nature of the work, and numbers and disposition of its personnel. Also, the product, or type, organization makes less productive use of the specialized skills from the standpoint of duplication—more of these personnel would be required —it would be more expensive of technically skilled people. However, in many cases, the organization becomes more of a product type organization below the staff level.

Specialization. The process of dividing work in an organization is usually planned in advance only in the most general form. The general characteristic of organizations is to begin as a single unit and grow by sub-dividing, much as a molecule. When arranging work distribution, these primary objectives are sought:

Accountability (control)
Economy
Efficiency
Program emphasis
Control of policy development
Lowering of the level of conflict settlement

Accountability, or assurance of policy execution by lower levels, can be accomplished through the hierarchy at times. However, when policy is dictated externally, the device of a special agency is used internally in order to discharge the dictates of the external policy making agency.

Efficiency can be increased organizationally at times through centralization, e.g., the grouping of common functions as in a typing pool, or in a type or product organization, depending on size. A "peak and valley" situation, such as occurs in budget work in typing is a good example. The management decision must be made on the basis of balancing the pros and cons, since adequate communications must be maintained.

Program emphasis is achieved

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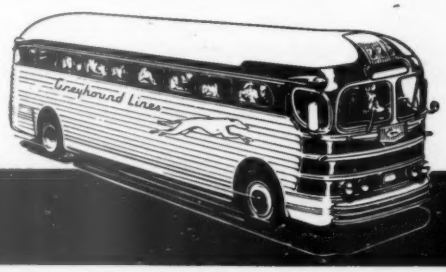

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organizationally through the use of the organizational independence vehicle. This means the establishment of separate branches assigned the same type-program within several divisions of the organization in accordance with assigned responsibility or function.

Lowering the level of conflict settlement is accomplished by arranging the organization in such a fashion as to settle conflicts at as low a level as possible. This accomplishes two things:

Conserves the time of high-level executives.

Permits more rapid settlement of disputes. The use of the informal communications method is the usual means by which this is accomplished.

Control of policy development can conflict directly with lowering the level of conflict settlement. However, better results may be obtained when this occurs, by the fullest use of communications channels.

Whenever these five values conflict, decision must be made by management as to which value must be emphasized at the expense of another. (This is where the management engineer can be of considerable assistance.)

Sometimes this policy is used as a vehicle for the establishment of functions or units for the primary purpose of securing some one individual, or to kick an undesirable individual upstairs, or downstairs. We have all seen this occur at one time or another, in both Government and business.

Another ruse sometimes adopted by the unwary is that of assigning functions to draw up a "good impression" organization chart. This satisfies the ego of the chartist, but accomplishes little or nothing, except to destroy the morale of the *human organization* which operates within the organizational entity.

Span of Control. The number of subordinates that can be effectively supervised by one person is called "span of control." Despite all the figures one hears to the contrary, with their concommitant case proofs, we believe that there is no set or fixed number of subordinates that the supervisor can properly supervise. These numbers are determined entirely by the time limitations imposed on the supervisor, the attributes of the supervisor concerned, and the amount of time each subordinate requires. Perhaps the ideal span of control will vary directly with the 3-dimensional concept of control span: LENGTH, BREADTH, and DEPTH. Should this be true, then the span of control should be determined by the number of *persons* reporting (BREADTH), the average number of matters handled (LENGTH), and the relative complexity of these matters (DEPTH).

Line, Staff, and Auxiliary. The operating, or "line" echelon of an organization is directly engaged in fulfilling the organization's mission. The group which lends support to the line is the "auxiliary" or service. "Staff" refers to the advisory group, based on specialized knowledge or data, to the top executive, or at times, to the whole organization. These definitions are valid only on a comparative basis. (Headquarters to field activity relationship, for example.) Staff should not be in the operations area – they are consultative, advisory, and specialty– however, their most important concommitant function lies in the coordinative, human, informal organization areas.

Unity of Command. In this principle lies the true hierarchical concept of organization. It implies that every man has no more than one supervisor. It also implies that each individual knows where he sits (organizationally), who reports to him, and to whom he reports.

Authority and Responsibility. This credo can lead to trouble if taken literally to mean authority *commensurate with* responsibility. This cannot happen in toto in Government because of budgetary, personnel, and accounting limitations, as well as legal review of all actions. What we mean, is that such responsibility is allocated within the available resources and authority.

Coordination. Here activities must necessarily be integrated with the *human organization* so that specialization does not result in compartmentalization, and restriction and authority become goals in themselves. Communication and its proper organization and utilization are vital to coordination.

Procedure. When a dilemma occurs in an organization, and backlogs pile up, workload becomes full time with no letup, overtime begins to appear as a steady diet, and staff morale begins to drop, it's time to take stock.

Taking a look at the organization should be the first step.

First, take a look at your organization. (Here is another place the engineer can assist in taking stock.)

Through work simplification and work measurement techniques, and assessment of staffing and organization, attempt to:

Eliminate any bottle-necks.

Eliminate any duplication of steps or work.

Eliminate unnecessary responsibilities.

Eliminate manual work by utilizing mechanical aids.

Decentralize any work to outside.

If none of these can be applied to assist in reduction of workload, procedures may be followed for securing approval of additional personnel, providing a workload and staffing study has been made. Work measurement can aid in establishing this. Prior to any reorganization, the supervisor should always seek to straighten out his present organization first.

However, numbers of positions in any organization are controlled by ceiling and budget factors, as well as by reason or organizational propriety and necessity.

The Humanities of Organization

The Human Element. The principal ingredient of any organization is that of the *human.* The administrative process is not necessarily a mechanistic complex of organization manuals, budgets, supervisors, procedures, efficiency ratings and progress reports. It is rather, in Ordway Tead's words, that "experience is well nigh conclusive that where friendly fields are made by congenial and trusted leaders, where the attractiveness and importance of group goals are made clear, where group pride is built up, where the personal stake

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of each person in the group is clearly grasped by all, where the leader has a personal concern and solicitude for the integrity and promise of each member of his group – where this whole body of conditions is being realized, the resulting group behavior will be productive and happy to an optimum degree."

Organization is a SOCIAL system. The entities of the so-called masses, hordes or units of people will tend to group themselves. The business of an organization could be accomplished by these groups without any formal organization, or despite the worst conceivable organization charts and organization and procedure manuals, providing these groups coordinate and communicate.

Staffing. Staffing is a technique which attempts to place the proper positions in the required organizational spots to carry out the assigned functions of the organizational unit. It includes the numbers and types of positions required to accomplish the predicted workload, and attempts to establish such staff in their proper relationships to one another, as well as to other related organizational echelons. It is here that budget and personnel controls first enter the organization picture, predicated on the fact that the best organization is worthless without people to staff it.

Effects on Management. Wherever there are individuals working, there must be controls in order to accomplish the purposes and goals of the organization. As mentioned above in policy control, organization and staffing are sometimes not used for the purposes for which intended, as given in the definition of good management. When such misuse is made of these management tools, the net result is a misplacement, or improper, emphasis of functions and staffing, less efficiency, and economy of operations, and eventually the entire job of establishing good organization and staffing must be redone with all its attendant increase in expenditures of time and effort. In addition, the effects of organizing to place, or eliminate, certain people has a demoralizing effect on the remainder of the staff. Another item which requires mentioning is that of the use of organization plans which are designed for the primary purpose of elevating a position to a higher pay level. The net result of this is the same as just described, where the organization is juggled for individuals. Such efforts are transparent, even though at times, deemed necessary in the eyes of the supervisor.

It is generally the policy of most organizations, in consideration of their present and future needs, that full utilization will be made of employee's skills. This includes assignment and reassignment of employees by management. This policy seeks the following objectives: (1) The selection of the best qualified persons available to fill vacancies; (2) opportunity for the progressive development of employees; (3) a high level of employee performance and satisfaction; (4) the retention of capable employees; and (5) training.

Where the manpower problem just described is coupled with the responsibilities listed, the impact on the total management picture can readily be seen.

We have attempted here not so much to sell management, but rather to point out that management is the human, or social organization; all other management practices are only the means by which we accomplish such human organization.

Borg Sales Manager Resigns To Found Redford Corp.

N. W. Alexander, Sales Manager of the Borg Equipment Division of the George W. Borg Corporation announced nis resignation effective June 30. He is founder of a new organization, The Redford Corporation, which will represent manufacturers in Upper New York State.

Mr. Alexander was born in Saranac Lake, New York on November 18, 1912. He received his B.S. degree from the University of the State of New York in 1939 and subsequently taught in the secondary schools in New York State and at Union College.

In 1941, he entered the employ of the Electronic Department of the General Electric Company as a test engineer. Later, he was transfered to the engineering department and then to the sales department, where he remained until 1949.

At the special request from officials of the Air Force, he was attached to Hq AMC at Dayton on special assignment for a period of two years.

In 1951, he joined the George W. Borg Corporation as Sales Manager of the Borg Equipment Division.

Mr. Alexander is widely known in governmental and industrial circles, where he has been a key figure in application engineering and sales of technical equipment. He has made several notable contributions in governmental and industrial sales.

GE Reveals New Commercial Jet Engine

Plans for a new commercial jet engine which will power America's fastest jet airliner, the medium-range Convair Skylark 600, were announced by the General Electric Company.

The new light-weight engine—designated as the CJ-805, a commercial version of the GE-J79—will produce more thrust per pound of engine weight than any other engine in its power class. Four will be used to power the Skylark 600.

The CJ-805 is designed to deliver far more thrust than the famous General Electric J47 jet engine, which today powers more U.S. Air Force planes than any other jet. It will incorporate several unique features especially designed for airline operation.

Proper Perspective in Sound Management

by Francis S. Drath
Deputy State Director
Selective Service System, Nebraska

THE INSPIRATION of superior management at the highest level permeates down through the lower echelons, carrying with it resultant benefits at all levels, yet it develops two undersirable by-products in the form of tendencies or inclinations which it fosters. One is the tendency on the part of the manager at the lower level, looking in awe and admiration only toward the top for guidance, to forget his own sphere of influence. The second by-product is the tendency to forget that competent management in an area is not only its own self-justification, but is certain to have its influence on other areas, those contiguous on the same or on higher or lower levels, forgetting also that sound management at the top echelon does not mean spending all available time putting the mind and imagination through the jumps in the effort to come up with something else that is new and inspired, but also implies watching the operation at all levels for any ideas or procedures which can be put into action on a wider scale.

Back of Change 7 to the Department of the Army's SR 615-100-1, which in operation should result in substantial saving to the government by the elimination of duplication in the matter of physical examinations for men being processed for possible entry into the Armed Forces, is a history which illustrates the influence of competent management in lower echelons upon all levels of a large and widely spread operation. It may serve as incentive to persons in command or supervisory positions at any level to apply themselves to careful examination of their activity with a view to improving its efficiency and economy in the one phase under their direction.

After the consolidation of responsibility for physical examinations in general in Armed Forces Examining Stations and the standardization of minimum qualifications, physical and mental, for acceptability into any of the Armed Forces, it became apparent to the Director of Selective Service that rejection for enlistment at an Armed Forces Examining Station should mean rejection for induction by Selective Service. With this in mind, on July 26, 1951, letters were sent to the Secretary of Defense and the Secretary of the Treasury requesting that the Selective Service System be furnished with a copy of the Report of Medical Examination (Standard Form 88) and a copy of the Enlistment Record (DD Form 4) for each person rejected for military service upon voluntary application for enlistment or commission. This request was considered by the Armed Forces Examining Stations' Policy Board and was denied.

As it became known throughout the Selective Service System that national headquarters was unable to implement a program whereby one physical examination would serve two purposes, it was natural to assume that some insurmountable obstacles stood in the way; that attempts at the top level having failed, no further effort in the desired direction could serve any useful purpose, even though a situation had evolved under which all prospective entrants into any of the Armed Forces were examined by the same stations and measured by the same standards.

At the operating level, that is, state headquarters' manpower division, which is constantly dealing with the Armed Forces Examining Stations concerning registrants forwarded for examination or induction, the idea that unnecessary duplication could and should be eliminated was constantly obtruding itself upon this author as Deputy State Director and Chief of Nebraska's Manpower division. In one of many discussions of this aspect of the joint operation, it was contended by the Deputy Commander in charge of the Armed Forces Examining Station, Omaha, that there was no reason why he could not notify our office, in whatever fashion necessary to accomplish the desired purpose, of the rejection of any Nebraskans who presented themselves for enlistment and were sent to the Omaha station for examination. In turn, as Deputy State Director, I was in a position to determine that such notification should be accepted by Selective Service Local Boards in Nebraska as basis for rejection.

Terms of this arrangement were simple. In each case where a prospective enlistee is rejected at the completion of his examination, a set of Standard Forms 88 in quadruplicate are prepared on the typewriter. In order to officially notify the Selective Service Local Board having jurisdiction over the individual concerned, all the clerical effort necessary was that the typist insert in his machine an additional Form 88 in order that an additional carbon copy for Selective Service purposes could be prepared at the time the other required Forms 88 were typed. In addition to this extra copy of Standard Form 88, the Station Commander agreed to prepare DD Form 62 (Certificate of Acceptability) on the individual con-

cerned. Standard Form 62 and carbon of Standard Form 88 were then forwarded to state headquarters.

When these forms were received at state headquarters, they were distributed to the local board having jurisdiction over the individual concerned with a note referring the local board to a directive published by state headquarters, in which it was administratively determined by the State Director that a DD Form 62 indicating that the person concerned had been rejected for enlistment, supplemented by copy of Standard Form 88, would be ample evidence upon which the local board could base a classification in IV-F.

This program was placed in operation in October of 1954, and after the first forms on rejected potential enlistees were received, the directive was published by Nebraska State Headquarters under date of November 8, 1954. A form letter was prepared to accompany each set of forms calling the attention of the local board to state headquarters' directive authorizing classification in IV-F on the basis of the evidence thus submitted.

In this manner was placed into operation a management program which, during the first year of operation, saved the government the expense of pointless examination of 99 Nebraskans who had tried to enlist in one or another of the Armed Forces and had been rejected at time of enlistment. While the average cost of travel for a selective service examinee the country over ranged from $5.09 in the fiscal year 1953 when 943,000 men were examined to $4.87 in fiscal year 1954 when only 380,000 were examined, cost of traveling in Nebraska averages considerable higher, since travel for Nebraskans, like residents of many of the western states, involves a greater average distance than for selectees the country over. In Nebraska, registrants travel as much as 440 miles from their local board to the Armed Forces Examining Station, and the cost for this trip to the Examining Station and return comes to as much as $40 per man. Taking the national average for statistical purposes, the saving in travel alone amounted to approximately $500. Projected on a nation-wide basis, considering that Nebraska has less than one per cent of the nation's population, the saving to the government for this period could have been 100 times the saving in Nebraska, or $50,000 in travel alone.

A vastly greater saving was accomplished by elimination of physical examinations, as a cost study by Fifth Army, cited later in this article, clearly indicates. Physical examination involves the services of medical, administrative and clerical personnel, the use of facilities, and such expensive processes as X-ray, serology, and outside consultation where needed, as well as meals and lodging for the men examined.

In addition to the direct saving resulting from elimination of duplicate examinations, due to lighter work loads because of reduced calls on Selective Service, the operating staff at the Omaha station was curtailed and the cost of a physical examination the first quarter of FY 56 was 30 percent lower than in FY 55. If nothing else the program under discussion contributed to the reduction in work load which made staff reductions possible and brought about a decrease in the cost per man examined.

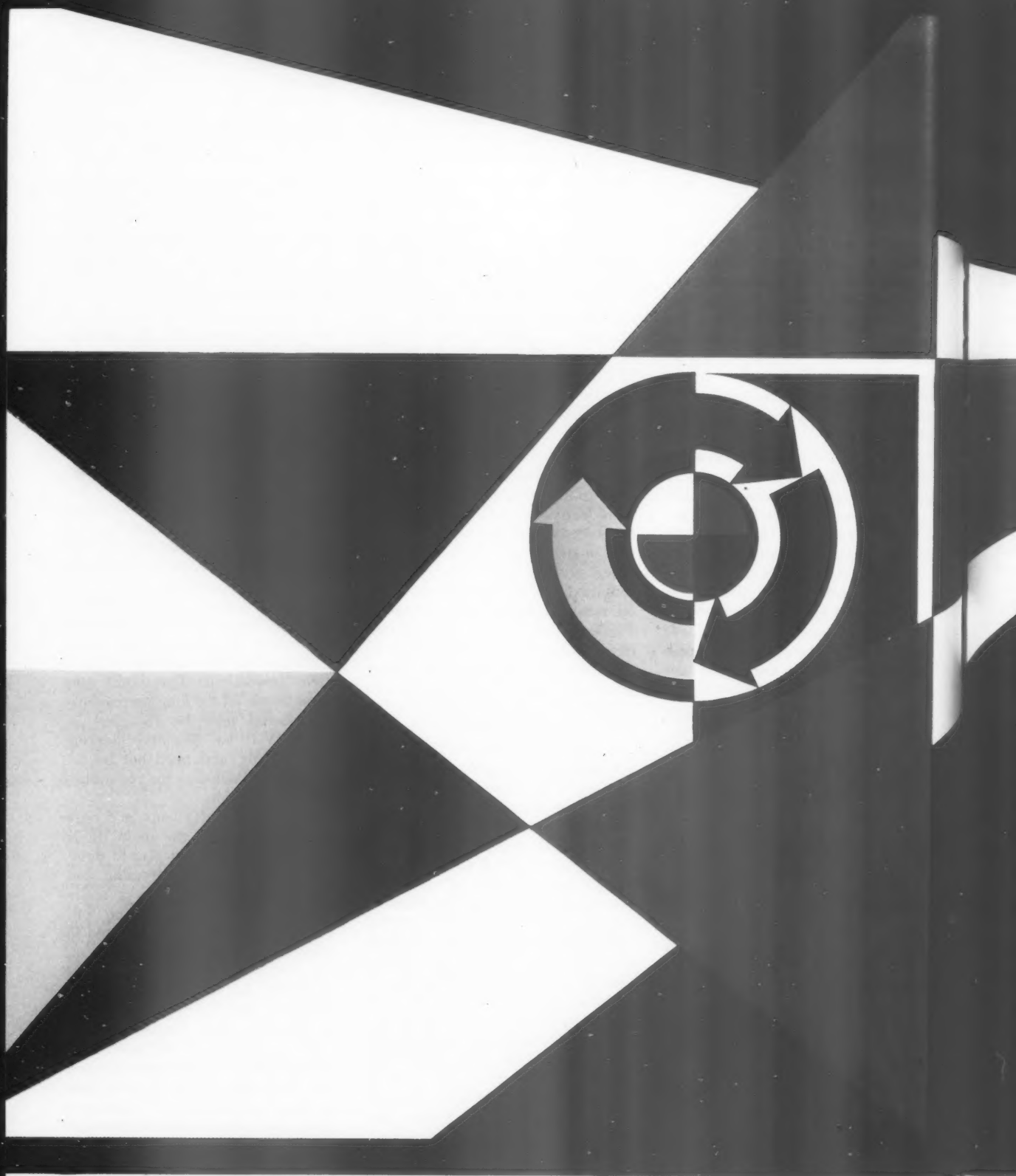
In March 1955 at a conference of Selective Service Directors and Recruiting, Induction and Examining Station personnel at Fifth Army Headquarters in Chicago, I made a report on the operation of this plan in Nebraska and it was proposed by a representative of National Headquarters that the program be tried throughout the Fifth Army area. State Directors present indicated interest and Fifth Army's MPPO agreed to give the plan a try in its area.

After a comparatively brief tryout by Fifth Army the program was adopted for use the nation over and was implemented by Change 7 to SR 615-100-1, which became effective 29 August 1955. Under this change, rejected applicants for enlistment in any service, including those rejected for mental as well as physical reasons, examined at any Armed Forces Examining Station anywhere, are reported to the State Director of the state in which the applicant resides by preparation of DD Form 62, supplemented by a carbon copy of Standard Form 88 prepared at time of examination. The State Director, in each case, forwards these forms to the local board having jurisdiction over the area in which the registrant resides. Authority for classification of all registrants upon whom these forms were received was extended to all local boards in the country in Selective Service National Headquarters' Operations Bulletin No. 133, issued September 13, 1955.

It can reasonably be claimed that the savings in cost to the government may total hundreds of thousands, even millions, annually. Estimates prepared by Fifth Army for the first six months of operation under this program, estimates which do not include travel costs borne by Selective Service and which are designed to err on the conservative side, reveal a saving in excess of $100,000 in that thirteen state Army area alone. During this period there were more than 4,000 applicants for enlistment turned down because of medical reasons, of whom 70 percent were classed as permanent rejects, and more than 2,500 mental rejects, 40 percent of them permanent. Translated into other terms, all the men permanently rejected may be classified in Class IV-F by Selective Service local boards, and need not be returned at a later date for pre-induction examination.

This record of events not only tends to illustrate the main thesis of the discussion, but also to demonstrate that the enervating by-products of operation on a many level scale may be shaken off; should not, in fact, be permitted to accumulate. Lack of perspective on the part of managers at lower echelons who fail to view their own problem clearly, objectively, and in its own setting, causes them to miss opportunities for instituting good practices at the bottom which will probably rise to the top, just as those instituted at the top eventually work their way down through the entire organization.

During FY 1954 there were some 74,000 accidents in the Army, excluding those in Korea.



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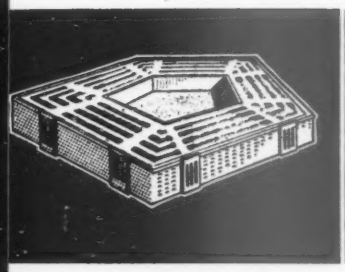

Washington Management

Department of the Army. Key Army Signal Corps depots throughout the nation and the Signal Supply Agency in Philadelphia have been linked together by use of an electronic data transmission system forming a network which will speed the reporting of logistical requirements. Depots tied into the new system are located at Sacramento, California; Decatur, Illinois; Lexington, Kentucky and Tobyhanna, Pennsylvania. The entire process—interchange of requirements and stock records—is handled electronically by transceivers during the night. During the day, the circuits are used for ordinary telephone communication.

Department of the Navy. The Navy has established a new training command at Omaha, Nebraska to supervise naval reserve activities in the United States and Hawaii. The command will be headed by a rear admiral operating under the Chief of Naval Operations, and will direct all reserve training units, except air squadrons, through the commandants.

Department of the Air Force. A new facility to be used for development and production of a guided missile system, is being constructed at Sorrento, California, by the Convair Division of General Dynamics Corporation. The new facility is expected to employ as many as 6,600 people by 1958, and construction costs to be approximately $40 million. Sorrento was selected because of its proximity to the Air Force test site at Sycamore Canyon and remote enough from other San Diego defense activities to meet technical and strategic requirements.

United States Marine Corps. The Hawaii-based First Provisional Marine Air-Ground Task Force has been re-designated the First Marine Brigade, and established as a permanent corps unit. The renaming does not involve any movement of troops, and is expected to strengthen the Corps.

Department of the Army. A television pickup system utilizing an aerial drone and designed to aid combat commanders in obtaining immediate ground evaluation, was publicly demonstrated by the Army at Bolling Air Force Base, Washington, D.C., on Armed Forces Day. Line TV shots can be made of strategic territory from the drone, a converted L-17 aircraft, and then broadcast to a ground control station.

Department of Defense. Defense Secretary Charles E. Wilson has placed management of all stateside traffic of the Armed Forces under the Secretary of the Army. The Military Traffic Management Agency, headed by Brigadier General Edmund C. R. Lasher, will control all commercial freight and passenger transportation used by the services.

Department of the Air Force. Andrews Air Force Base, Maryland, has been selected as the permanent site for Headquarters, Air Research and Development Command. After careful consideration, Andrews AFB was selected, to increase efficiency of operation, nearness to Washington and convenience to representatives of industry and the nation's scientific community.

Department of the Navy. Operating under the management control of the Bureau of Ships, the Navy will construct several offshore platforms for obtaining ocean environmental data. The platforms differ from the offshore "Texas Tower" platforms in design, size and purpose. They will house personnel who will study temperature and pressure variations in the sea, salinity factors, thermal gradients, and periods and lengths of ocean waves.

Department of the Air Force. The 99th Heavy Bombardment Wing (SAC) Fairchild Air Force Base, Washington, has begun conversion from Convair B-36's to the eight-jet Boeing B-52 bomber. At the same time, the 99th wing will transfer to Westover Air Force Base, Massachusetts. A portion of the B-52 ground training will be accomplished prior to transfer, however it is not expected B-52 transition flight training to be started at the Washington base.

Department of the Army. A giant cross-country vehicle capable of crossing deep snow fields and other rugged Arctic terrain without reliance on conventional sled runners or mechanical treads, has been developed for the Army by R. G. LeTourneau, Incorporated, of Longview, Texas. The 174-foot long vehicle travels on 16 of the largest tires in the world. The prototype "Sno-Train" consists of a control and power generating car and three powered cargo trailers. Each wheel has its own electric drive traction motor receiving power direct from diesel-driven generators in the power car.

Department of the Air Force. A chain of 21 radar installations located on eight islands extending from Florida into the South Atlantic to police the traffic of Air Force supersonic rockets and missiles fired over the ocean, have recently

JULY ANNIVERSARIES

Army Medical Corps	*27 July 1775*
Army Judge Advocate General	*29 July 1775*
Army Chaplains Corps	*29 July 1775*
United States Military Academy	*1 July 1802*
Army Air Force Exchange System	*25 July 1895*
Armored Forces	*10 July 1940*
Continental Army Command	*26 July 1940*
Military Police Corps	*31 July 1941*
Troop Carrier Command	*17 July 1942*
Waves	*30 July 1942*
Army Transportation Corps	*31 July 1942*
Air Training Command	*7 July 1943*
Air Materiel Command	*17 July 1944*
National War College	*1 July 1946*

been placed in operation. The radar sentinels can keep such close track on weapons fired from the Air Force's Cocoa Beach, Florida, launching site, that any missile straying from its course can be destroyed by the push of a button before it can fall on any populated area. Built by the Dynamics Corporation of American, the radar stations will record missile and rocket flights.

Department of the Navy. A transistorized all-electronic telephone switchboard which uses no vacuum tubes or mechanical stepping switches has been developed by the Stromberg-Carlson Division of General Dynamics Corporation. A 100-line, 15-link system designed for shipboard installation, it requires less than half the space now required and weighs about one-quarter as much as corresponding electro-mechanical boards.

Department of Defense. Another Hoover Commission recommendation, which will allow servicemen to ship their automobiles overseas via private shipping lines at government expense, is expected to be cleared within the month. The bill number S 2286, allows the shipping of automobiles for personnel traveling under permanent duty orders on commercial carriers, and is designed to take the load off MSTS ships. In 1954 MSTS transported some 71,000 autos overseas, at a cost of more than $18 million.

Department of the Air Force. Professor Courtland D. Perkins of Princeton University is succeeding Dr. H. Guyford Stever as Chief Scientist of the Air Force. Dr. Stever will return to MIT after serving as Air Force Chief Scientist for 18 months, which is six over the normal assignment.

Time-Saving Computer to Cut Cost of Jet Engine Development

A giant computing machine that could save up to two years in the costly development of advanced-design jet engines has been built for the Air Research Development Comamnd by the General Electric Company.

One of the largest ever built, this unique analog computer will enable engineers to "fly" jet engines before they are built and to forecast performance characteristics of control systems for jet engines that are still on the drawing boards.

The computer will become the "brain" for a jet engine simulator that will reduce costly wind-tunnel testing and cut down the time and cost of flight-testing, both vital phases in the race to develop stronger and faster aircraft.

The jet engine simulator was developed and is being built by General Electric's Aircraft Gas Turbine Development Department under an ARDC contract. The computer for the simulator was designed and built by the company's General Engineering Laboratory here.

"Flying" the computer, an engineer can become a "test pilot" and in a matter of a few hours can see how his blueprint engine reacts to such conditions as giving it the throttle at 20,000 feet altitude, 40 degrees below zero air temperature and at a speed of 1,260 miles an hour.

Monthly Investment Plan

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NEWS BRIEFS from the SERVICES

Pearl Harbor Shipyard, Hawaii, A plan proposed by the Shipyard to eliminate the duplication of spare parts inventory in the Pearl Harbor area will result in havings of $18 million in inventory and estimated savings of $337,000 in annual operating costs. An extensive study was made seeking to find plans to eliminate the duplication of supply effort between the shipyard and the supply center. The plan which received the approval of both BuShips and BuSandA, certainly reduced our national defense costs.

Oakland Army Terminal, Fort Mason, California. Oakland Army Terminal held the first two places in the latest tabulation of standings in the Fiscal year 1956 Motor Vehicle Fleet Safety Contest sponsored by the East Bay Chapter, National Safety Council. The Terminal's Fort Mason Motor Pool leads the 11 public service organizations with an index of 1.41. The Terminal's Oakland Motor Pool stood second and Pacific Telephone and Telegraph Company was third.

Naval Air Station, Olathe, Kansas. Here is a novel idea that pays off with results. Commanding Officer's, Executive Officer's and other key personnel eat breakfast together every Saturday morning. The matters of the station are discussed, flight schedules, priority projects and the week's work schedule are among the subjects of mutual interest.

Fort Hamilton, New York. Processing time for army personnel passing through the station has been under the scrutiny of Colonel John S. Sabine, center commander since September, 1955. With better management this processing time has been reduced from five days to less than one. The present eight-hour processing system saves an average of three non-productive days.

Moffett Field, California. Captain Arthur Sinclair Hill, USN, has assumed command of the Naval Air Station. Prior to this assignment Captain Hill was commander of Fleet Air Wing 14, based at Naval Air Station, North Island, San Diego. Captain Paul W. Watson who has been skipper of Moffett Field since October 1953, retires this month after more than 30 years of naval service.

Headquarters 11th Air Division (Defense) APO 731 Seattle, Washington. The 11th Air Division has a shiny new plaque, hand inscribed on leather, which is awarded quarterly to the organization within the Division, contributing the most toward improving its management program. The 449th Fighter Interceptor Squadron, commanded by Major Lawrence E. DeZonia, USAF, was the first organization to win the coveted prize. Presentation was made by Brigadier General T. Alan Bennett, USAF, Division Commander.

Quartermaster Food and Container Institute, Chicago, Illinois. The annual Technical Directors Award of the Quartermaster Research and Development Command was presented recently to SP3 George Kurtz, for his work in developing a successful process for removing oxygen from hermetically sealed containers. Kurtz, the first member of the military to receive the award, received his B.S., M.S., and Ph.D. from Pennsylvania State University.

Naval Air Station, Lakehurst, New Jersey. Construction of the new $16-million Naval Ship Installations Test Facility being constructed by BuDocks to conduct test and evaluate aircraft carrier launching and recovery systems has recently begun at the station. Expected to take approximately two years to complete, the new facility will provide a long-needed center for this type operation.

Army Aviation Center, Fort Rucker, Alabama. Army helicopter instrument flying came of age recently when Brigadier General Carl I. Hutton, commanding general, awarded 13 helicopter standard instrument certificates to three officers, seven warrant officers and three civilian flight instructors of the Army Aviation School. This first group of 13 qualified helicopter instrument pilots forms a nucleus for eventually training all Army cargo helicopter pilots.

Hickam Air Force Base, Hawaii. M/Sgt. Rube C. Wells, USAF of the 1502d Periodic Maintenance Squadron, designed and fabricated a new method for performing static calibration of the torque oil pressure indicating system, which has proven to be both a time and money saver for the organization.

USNS Pvt. William H. Thomas, MSTS, Brooklyn, New York. In a recent shipboard ceremony the Marine Section, National Safety Council and the American Merchant Marine Institute, awarded this vessel the 1956 Safety Achievement Award for passenger ships. The award was made in recognition of the transport's efforts in assisting the freighter Darnel when her boiler exploded last February 350 miles off the coast of Portugal.

Engineer Research & Development Laboratories, Fort Belvoir, Virginia. Jacqueline N. Cousins, an organization and methods examiner, has been elected chairman of the agency's Junior Management Board. Formed 18 months ago to place managerial responsibility on a selected group of middle-grade employees to stimulate ideas on policies, procedures and operations, they are materially assisting in the present and future development of the laboratories.

Naval Communication Station, San Diego, California (Naval Communications Bulletin) "Radio San Diego", the first to broadcast the news of the Japanese attack at Pearl Harbor, observed the "Fiftieth Anniversary" of the station last month.

SERVICE SCHOOLS

Antiaircraft Artillery and Guided Missile Center, Fort Bliss, Texas. Major General Robert J. Wood, USA, former Deputy Commanding General, has been named Commanding General of the Center.

Army Logistics Management Center, Fort Lee, Virginia. This new designation, recommened in a study prepared by a civilian management firm for the Deputy Chief of Staff for Logistics, represents an expansion of the Army Supply Management Course which was established in October, 1954. The Center will continue the present course and will, in addition offer four new management courses in the specific fields of procurement, requirements, storage and distribution, and maintenance. The first course, procurement management, is scheduled to begin this month. All courses are of eight weeks duration, and it is expected that more than 1000 students will be graduated from the Center each year.

Forbes Air Force Base, Kansas. Graduation exercises were held recently for 33 base personnel attending the new 50-hour management supervision course. Colonel Richard D. Dick, base commander, addressed the officer and selected enlisted students urging maximum utilization of the course.

The Infantry School, Fort Benning, Georgia. Major General Herbert B. Powell, USA, presently Commanding General of U. S. Army, Pacific, will assume command of the Infantry School next month. General Powell has held many important assignments since becoming a Second Lieutenant of Infantry in the Regular Army on June 30, 1926, and brings to the school a wealth of experience.

United States Coast Guard Academy, New London, Connecticut. A recent announcement showed 413 out of 1167 men taking the competitive examination for the Academy had passed with flying colors. From this group approximately 250 men will be selected to start training this month as future officers of the United States Coast Guard.

Chemical Corps Training Command, Fort McClellan, Alabama. Four general officers and an impressive list of educators, industrial and government leaders in the field of management were the lecturers for the first Management Subcourse to be included in the Advanced Officer Course. The subcourse was not only the first management sub-course to be given at The Chemical Corps School, but is believed to be the first management sub-course to be offered with its Advanced Officer Course by any technical service.

George Washington University, Resources Management Program, Washington, D.C. Ninety-six Air Force officers and key civilians were graduated recently from the thirty-second Commander's Class. More than 3,500 have attended the special courses designed to assist management within the Air Force.

Fort Riley, Kansas. Eleven post commanders and staff representatives from 12 installations within the Fifth Army Area attended a three-day command management system orientation being conducted by Department of the Army, Fifth Army, and Fort Riley officials. During the session the group was briefed in considerable detail, on the mechanics and goal of the new command management system which the 12 installations will begin using in October.

Marine Corps Schools, Parris Island, South Carolina. Brigadier General Wallace M. Greene, USMC, who heads Recruit Training at Parris Island, has recently announced that Marine "boots" will be required to spend 12 weeks in basic training instead of the 10-week period established in July, 1953. This period exceeds that allowed by the other services, however is expected to ease the pressure on both trainees and drill instructors.

Ordnance Tank Automotive Command, Detroit, Michigan. Mr. Raymond A. Pulk, Chief of the Materials Laboratory at Detroit Arsenal, addressed more than 500 engineers and scientists from Free Europe, Great Britain, Canada and the United States, recently in Reutlingen, Germany. The meetings were held under the sponsorship of the Forster Institute in West Germany, information on the latest techniques involving high voltage radiography, ultrasonics, electrical measurements, and magnetics was presented.

Armed Forces Staff College, Norfolk, Virginia. Major General Aubrey S. Newman, former Deputy Chief of Staff for Administration, United States Army, Europe, has

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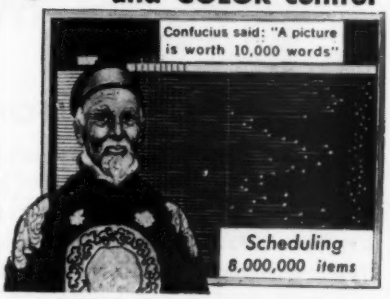
But automatically checks with TIME, LINE and COLOR control



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- Its simplicity has put it into world-wide use.
- Analyze 100 items in 10 seconds.

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been assigned as Deputy Commandant of the Armed Forces Staff College.

U. S. Naval Submarine School, New London, Connecticut. The Navy has selected 88 active duty line ensigns and lieutenants (jg) for the submarine school class which convenes on the second of this month. Applications for the next class should reach the Bureau of Naval Personnel not later than 1 September 1956.

Cincinnati Air Reserve Center, 9527th Air Reserve Squadron, Cincinnati, Ohio. Flight D (JAG) recently graduated ten members, each in civilian life a local practicing attorney, from a course in Military Justice with the U. S. Air Force. The ten reservists then flew to Washington, D.C. where they were honored by being admitted to practice before the United States Supreme Court and the United States Military Court of Appeals.

Army Transportation School, Fort Eustis, Virginia. 81 officers were recently graduated from the Associate Transportation Officers Advanced Course, the largest individual group in the school's history. Among the graduates were 11 allied students who will return to their respective countries with the latest techniques in Army Transportation.

The Armored School, Fort Knox, Kentucky. Colonel Vincent L. Boylan, heads a new combat organization known as Nonresident Instruction Department. With missions and activities unchanged, the Nonresident Instruction and Training Literature and Reproduction Departments of the Armored School have been combined.

Reese Air Force Base, Lubbock, Texas. The Spring Mid-management seminar which began on March 12th, recently graduated 18 officers and key enlisted men at Reese AFB.

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AF Contract to Ryan for High Altitude Firebee

A new, high altitude version of the Ryan Firebee jet drone missile will be built and flight tested by Ryan Aeronautical Company, T. Claude Ryan, company president, announced. The new Air Force contract calls for the Firebee to be capable of operation at altitudes in excess of 50,000 feet and at high subsonic speeds.

Designated the XQ-2B, the new Firebee will be a modified version of the now operational Ryan Q-2A, incorporating a different jet engine, an improved control system and a high-altitude wing with increased area.

Flight testing of the first two XQ-2Bs is scheduled to begin at Holloman Air Development Center, Alamogordo, New Mexico, this summer.

For target training at the extremely high altitudes of modern jet warfare, the Air Force does not at present have a drone capable of realistically simulating enemy jet fighters and bombers. Ryan Q-2As now in production are designed as medium altitude (up to 40,000 feet) target drones. These are being placed in operational use at several Air Force installations for use in weapons system evaluation and crew training.

Navajo Freight to Take Over F&S

Navajo Freight Lines, 381 S. Broadway, has received final approval from the interstate commerce commission to take over F. & S. Transit Co., midwestern carriers, officials said recently.

Navajo's purchase will expand the firm's service into the industrial and manufacturing regions of Illinois and Indiana. The F. & S. routes serve intermediate towns between Chicago and Fort Wayne, Ind., including such industrial centers as Michigan City, South Bend and Elkhart.

Addition of the new routes, officials said, will provide direct service between the Indiana points and Navajo-served areas including Denver, Albuquerque, Amarillo, Los Angeles and Oakland.

Robert S. Cohen, Navajo secretary-treasurer, also announced that gross revenue for the second consecutive month set a new record high.

GM to Power Lockheed Electras Ordered by Braniff Lines

The General Motors' "matched team" of Aeroproducts propellers and Allison 501 turbo-prop engines will power the nine Lockheed Electras ordered by Braniff International Airways, it was announced by Chas. E. Beard, president of Braniff, and E. B. Newill, vice president of General Motors and general manager of the Allison Division.

Selection of the Aeroproducts propellers has just been made following extensive engineering evaluation of other propellers offered for the new turbo-prop airliner. The Allison 501 engine was designated by Braniff when the airplane order was placed with Lockheed in December of last year.

The nine 400-mile-per-hour aircraft, engines, propellers and related equipment will represent an investment of approximately $22,000,000 and is part of Braniff's recently announced fleet expansion program.

"We feel that not only have we purchased the best propeller and engine for this aircraft available anywhere in the world today, but that we also have gained the added advantage of purchasing an entire turbo-prop power system from a single manufacturer," Mr. Beard declared.

"Also in favor of the Aeroproducts propeller is the extensive experience which will have been accumulated by the propeller-engine combination by the time it goes into service on our routes in 1959," he added.

Paper "Shells" Save Expense In Cannon Tests

The Army has found a way to make one dollar go as far as 10 with a paper and water artillery projectile.

Made to test-fire only the 105mm howitzer at present, the new shell provides an inexpensive means of checking the weapon's recoil mechanism.

Costing about $1, the paper projectile has the same weight and resistance to the expansion of propellant gasses as conventional metal shells which run $10 apiece.

Developed at an arsenal in Rock Island, Ill., the money-saving test-device consists of double wax-impregnated heavy paper tubes four inches in diameter and 42 inches long.

Each end of the cylinder is sealed with three one-eighth inch cardboard disks. The water is added to the projectile through a small hole at the front which is sealed with a cork.

Loaded through the gun's muzzle, instead of the breech, as are standard rounds, the shell is filled with water just before firing.

According to the Army, the blast of water and cardboard fired from the howitzer is harmless beyond 125 feet.

Second Annual National Strategy Seminar Ends

The second annual National Strategy Seminar ended recently at the Army War College with concluding remarks by Secretary of the Army, The Honorable Wilber M. Brucker. These followed presentations by civilian guests and student-officer committees as a result of three days' of conference at Carlisle Barracks.

Principal objective of the Seminar was to make available to the officers of the College the important civilian experience and broad outlook of nationally prominent American citizens, and of exchanging views and understanding in the light of modern military thought in the field of strategy.

Guest lecturers during the Seminar were the Army Chief of Staff, General Maxwell D. Taylor; The Honorable Allen W. Dulles, Director of the Central Intelligence Agency; The Honorable Joseph M. Dodge, Special Assistant to the President; and The Honorable Robert Murphy, Deputy Under Secretary of State. Following each lecture, the distinguished civilian and military guests joined the officer-students in comprehensive committee discussions of current and future problems of national strategy.

Among the 70 nationally prominent persons, both civilian and military, who joined the students and faculty in examining national strategy were outstanding authorities in the fields of business, education, finance, science, agriculture, labor, religion, law, communication and government, among others.

All American Develops New Troop-Landing Method

A revolutionary new method of launching assault boats at beachheads from airplanes has been developed by All American Engineering Company, it was announced.

The inventor of the device, E. B. Pierce of All American Engineering, has been granted a patent for the method. He said that the technique is "a new concept in speeding up troop movements in time of emergency and represents a major advance in mobility".

A cargo pod or landing barge is attached to the underside of—or placed inside—an aircraft equipped with a variation of AAE's Universal Landing Gear, hydro-lift skis that allow the aircraft to land on water and keep it on the surface as long as forward speed is maintained.

The barge, which has its own motive power, is detached from the aircraft, or released from inside, as it maintains forward taxi speed. As soon as the barge is released, it proceeds to the beach and the aircraft takes off and returns to the loading point to pick up another. The entire landing operation is performed without stopping the forward speed of the aircraft.

In addition to providing faster troop movement, All American's technique could land troops in reef-infested waters, which has not been possible with other airplane-boat devices. The reason is the hydro-lift landing gear, which enables the aircraft to taxi over the reefs.

Pre-Ice Age Tree Stump Excavated at Site of Atomic Plant

A petrified tree stump with an estimated age of 80 million years has been excavated by workmen on the site of the Army's Nuclear Power Package Reactor at the Corps of Engineers' Research and Development Laboratories, Fort Belvoir, Virginia.

A left-over of the "cretaceous" age, the stump could be as much as 130 million years old, according to Dr. Roland Brown, a U. S. Geological Survey paleobotanist who identified it at the Smithsonian Institute. The stump predates the Ice Age by many millions of years.

OPERATION HUNTER-KILLER

1600 hours. U.S.S. Tarawa launches 2 Grumman S2F airplanes to sink an "enemy" sub stalking HUK Group IV from an area 70 miles away during recent Anti-submarine Warfare Operations in the Caribbean Sea.

AIR ATTACK FROM DAVY JONES

0900. No datum. All night planes and destroyers have fed reports to Tarawa's darkened Combat Intelligence Center. The plot boards show only friendly shipping.

1618. S2F's start search with electronic gear that can detect snorkel, periscope, or sub radar, even the submerged sub's disturbance of the earth's magnetic field.

1900. Relief S2F's are launched; the others recovered aboard carrier. S2F's in the air keep the sub under and blind, afraid to even show periscope at night.

An enemy could air attack our cities with missiles launched from submarines. With the air-breathing snorkel and atomic power, the submarine has become a true and most elusive submersible. Your Navy's counter weapon is the Hunter-Killer Group, dedicated officers and men on destroyers and carriers operating Grumman S2F sub-killers.

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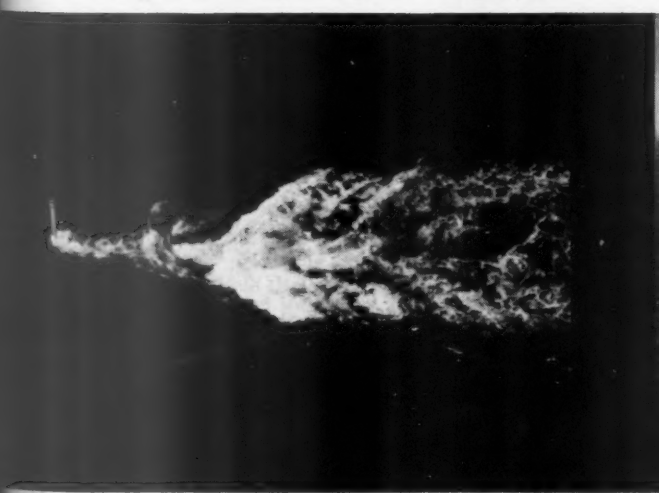
Designers and builders also of the supersonic F11F-1 Tiger, transonic F9F-8 Cougar, SA-16 Albatross rescue amphibian, metal boats, and Aerobilt truck bodies.

0905. An S2F makes radar contact. Snorkel 8 miles away. Gone. The diving S2F drops sonar buoys. Echoes. Fix! He attacks with depth charges and homing torpedo.



0920. S.S. Piper surfaces to say she has been "sunk". S2F's return to Tarawa, ending the 4-week war games during which the sub scored no hits on the task force.

by Lt. Col. J. C. Coleman, Jr., GS
Oversea Supply Agency
New York

PROJECT MASS

A Modern Army Supply System

PROJECT MASS is the Forward Look, the Big Change, and the Streamlined Procedures of the supply system to support atomic and hydrogen type warfare in the field.

It introduces for the first time a completely new approach to Army supply—not a revision of existing methods. It presents revolutionary thinking on the part of logisticians and a concept in supply that has never been possible before.

The modern field Army, with its increased mobility and firepower, demands and deserves a supply system compatible with it; a supply system that will support this new Army in a manner that will complement its combat effectiveness.

To accomplish this, an entirely new supply system, especially designed for the purpose, has been developed under contract with the Army Logistics Research Group utilizing the latest Army techniques of electronic communications, air transportation and Army Field Stock Control which provides for selective stockage of fast turnover items. This Modern Army Supply System has been approved by the Deputy Chief of Staff for Logistics for test beginning 1 July 1956. The test will be conducted under the name PROJECT MASS. During the test period, Project MASS will be limited to the supply of repair parts for the Seventh United States Army in Europe. Detailed procedures will be provided in a Department of the Army regulation.

Project MASS is the first concentrated and coordinated attack on all of the deficiencies of the Army supply system at the same time. There have been piecemeal efforts to improve various aspects of the system from time to time; but never before have all areas of supply such as requirements, requisitioning, transmission, stock control, procurement, storage, stockage, packing, shipping, inventories, transportation, communication, documentation, accounting, reporting, etc., simultaneously come under such minute scrutiny for improvement. Such action is bound to bear fruit in a better Army supply system.

The basic principle of Project MASS is to provide maximum service and minimum stock. When this principle becomes highly developed, it will result in material savings in manpower, national resources, and time. These savings will result from reduction of large inventories at COMZ and Army levels, long pipelines filled with supplies, and 120 or more days order and shipping time. An undetermined dollar mark can be attached to each of these savings.

Science and technology has made it possible to accomplish this objective by the integrated use of the latest developed means of communication, data processing and transportation. By transceiver communication a demand may be known in the United States instantaneously with it being expressed in Seventh Army. By this phenomenal means of requisitioning; by the depots mechanizing to the maximum operations in their stock control, storage, and shipping divisions; and by the method of transportation being utilized in accordance with the needs of the customer, Project MASS has set as a goal of attainment an order and shipping time of 20 days by water or 10 days by air as directed by Seventh Army.

Because of these revolutionary aspects of Project MASS, all persons engaged in supply activities are urged to accept the new concept with an open mind. Think of how it can and will work, not of why it cannot work. Be constructively critical? Yes! But not hardheaded or narrow-minded about it. Give our supply system a chance to be its best. Do not evaluate or compare MASS with existing procedures or regulations. They were not limiting factors in the new design. Where conflicts exist, authority has been given to make the necessary exceptions to regulations.

Under Project MASS there are six distinct levels or functional ac-

tivities that participate in the supply of an item. Three of these activities are within Seventh Army and three are within CONUS. They may be followed on Figure 1. A brief description of the functions of each activity is as follows:

1. *Organizational maintenance.* This includes all units, organic or separate, from the regimental level down whose mission it is to perform various types of maintenance. Examples are lettered companies of a battalion or units attached to regimental headquarters for maintenance functions. A minimum stock of preselected, fast moving repair parts, constituting a basic load, will be carried at this level to meet the unit's mission. No formal records for stock accountability will be carried at the organizational maintenance level.

Demands for replenishment of stocked parts and for supply of items not stocked will be made by the supply clerk hand writing the item desired on the new single line field stock control form. These single line requisitions will not be consolidated at this level, but will be hand carried from each individual unit to the direct support stock control point, which is the next higher echelon of supply. The presentation of the single line requisition form by the organizational maintenance supply unit to the direct support unit will, within itself, constitute a justifiable requirement and an appropriate demand. No further justification, approval, or paper work will be required. If the item is stocked at the direct support unit, it will be immediately issued.

2. *Direct support.* This will normally be a unit at the divisional level. Direct support will consist of technical service units whose mission it is to provide higher level maintenance and to replenish repair parts to the organizational maintenance units. Examples of direct support units are the Engineer field maintenance company, the lettered companies of the Ordnance battalion, the Ordnance direct support company, etc. A minimum stock of repair parts will be carried at the direct support level to accomplish the mission of the unit. The items stocked at this level will be selected on the basis of usage experience, the criteria normally being three times in 180 days. The same items will be stocked at this level as are stocked at the organizational maintenance level, plus a minimum number of insurance items. Stock control records will be maintained at this level to "manage" the stock, but not as accountable property records.

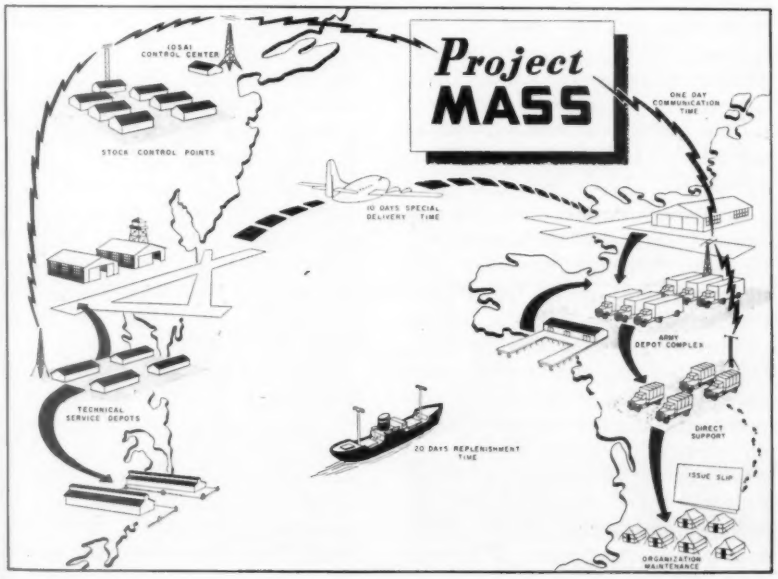
At the direct support level, all data pertaining to the supply system – requisitions, stock control, shipping, receiving, accounting, reporting, etc.,–will be converted to punch cards. All necessary data will be recorded on these cards by a combination of numbers and letters. These punch cards embody a system of high speed electronic transceiver communication and data processing. From this point on, these data will remain in this same language.

Normal demands for the replenishment of stocked items and special demands for the supply of nonstocked items will be transmitted to the next higher supply echelon, the Seventh Army depot complex, by transceiver. This transmission will be accomplished twice daily. Cards are punched at any time a requirement becomes known for requisitioning items not stocked. For stocked items, a card is punched whenever the stock control record indicates the reorder point has been reached. There will be no waiting period for consolidation.

3. *Army depot.* At the Seventh Army depot complex an additional stock will be carried to replenish the lower echelons and to support the heavy maintenance activities within the Army. The items composing this stock will also be selected on a usage basis, using the same criteria as at the direct support level. This stock will consist of all the items stocked at the direct support level, plus a larger list of insurance items. The stock at the Army depot complex will be a relatively small number of line items, estimated at about 50,000. In order that this drastically reduced number of line items be adequate, a reliable back-up replenishment program must be assured from CONUS. This stock will fill about 85% of the demands. To fill the remaining 15% of the demands, a stock ten times or more as large would be required. The extremely large number of slow moving, seldom used items will be supplied from CONUS on an individual basis by premium service when and as required. Therin lies the application of the basic principle of Project MASS by substituting service for stock.

Stock control and accountable stock records will be maintained mechanically at the Army level by a data processing unit. Transceiver cards received from the direct support units will be mechanically

Figure 1.



sorted into two groups—authorized stocked items and those items not authorized to be stocked. The system is designed so that those items that are authorized to be stocked will be in stock or due-in. This first group of cards is again mechanically processed against stock control balance cards. The old balance is adjusted by subtracting the current requirement. A new stock record balance card is given out by the machine. Warehouse number and bin location are reproduced into the requisition card. This group of cards is then transmitted to the appropriate Seventh Army technical service depot that is being directed to fill the requisition. Army depots will fill requisitions on a daily basis, delivering the parts to the requisitioning units by courier, thus relieving the combat commanders from having to pick up items requisitioned.

The second group of cards, representing those items not authorized to be stocked in Seventh Army, known as "fringe items," will be transmitted daily by transceiver directly to the Oversea Supply Agency for filling from CONUS stocks.

Replenishment of stocked items will be initiated by Seventh Army by punching a card when stock control shows a predetermined reorder point has been reached. This reorder point will be a percentage of the requisitioning objective, perhaps 60% to 75%, as experiences will dictate. The reorder point may vary for different items. These replenishment requisition cards will also be transmitted by transceiver directly to the Oversea Supply Agency for filling from CONUS stocks. Transmissions will be made daily and not held for consolidation.

4. *Oversea Supply Agency — CONUS National Control Center.* Transceiver cards representing normal demands for items stocked in Seventh Army and special demands for non-stocked items will be received daily in the Oversea Supply Agency which will serve as the CONUS National Control Center. From here demands for non-stocked items will be immediately retransmitted by transceiver to the appropriate technical service stock control point. Demands for replenishment items will be retransmitted, also by transceiver and within two hours time, directly to the technical service distribution depot designated to support Project MASS.

The National Control Center will also perform stock control analysis, and maintain statistical data for reports to Deputy Chief of Staff for Logistics.

5. *Technical service stock control point or depot in CONUS.* Demands for fringe items received at the technical service stock control point will be mechanically reviewed by high speed data processing machines for national availability. If available within the supply system they will be transmitted within four hours by transceiver to the appropriate depot for shipment. If the item is not available nationally, it will be immediately extracted to procurement for delivery by premium transportation to an aerial port for airlift to Seventh Army. In this instance, procurement procedures will be simplified to the maximum within existing Congressional laws.

The card received at the technical service distribution depot for replenishment of items stocked in Seventh Army will be mechanically processed by reproducing a green card for picking stock and packing purposes and a set of red cards for shipping purposes. The respective colored sets of cards will be distributed so as to expedite storage and shipping functions, which will be completed within two working days. These technical service distribution depots will maintain a stock identical to that in the Seventh Army depot complex, plus additional insurance items. These depots will be in effect rear area supply points to Seventh Army moved from the communications zone to the United States.

6. *Transportation.* The Seventh Army Transportation Control Center will designate the time that items are required by the requisitioning unit. This will be accomplished by a system of letter codes transmitted in the punch card requisition. This code will be perpetuated in all subsequent cards and distinctly marked on the cargo packages. It will be the responsibility of the CONUS activities to meet the target date established by the oversea command. The code will also permit the systematic and orderly handling of the cargo to reach the customer by the date required. The following three codes will be used:

Code 1—item needed when requisitioned, shipment to be by fastest available means.

Code 2—item for replenishment of fast moving stock, shipment to be by expedited surface and marine express transportation. Domestic airlift may be used to meet port schedules.

Code 3—seasonal requirements, shipment to be by routine or normal methods.

Documentation will be simplified and streamlined by use of data processing machines and the punch cards prepared by the technical service depots. Maximum consolidation will be achieved through the use of containerization and palletization.

The Oversea Supply Agency, also serving as the National Movement Control Center, will control air tonnage allocation, release cargo into the aerial port, inform Seventh Army by items of cargo shipped, and receive acknowledgment of receipt of items from Seventh Army. All of these functions will be performed by high electronic mechanical methods.

Project MASS will come into full growth by a process of evolution as certain types of highly specialized electronic equipment becomes available and are integratedf into the system. The ultimate potential of such equipment may be even greater than is visualized today.

The Modern Army Supply System, as described above, has as its underlying principle, the stocking of items used most frequently with the organization that uses them, the stocking of less frequently used items farther to the rear, and the seldom used items being kept out of the combat zone until called for, then using premium service in communication and transportation to effect timely supply.

One thought is mandatory throughout Project MASS—maintain the constant combat readiness of the Seventh Army! This will be accomplished by the conventional supply system continuing to be operated concurrent with the MASS test. The conventional sys-

tem will continue to supply all items except repair parts. As an insurance factor, while Project MASS is ironing out the bugs and should the test run into trouble for any reason, the conventional supply system is available to go into action immediately and resume support of Seventh Army for repair parts.

Note that Project MASS reverses the old supply axiom that has stood for so many years—the impetus of supply must always be from the rear. Under the MASS concept the impetus is from the front as a vacuum draws the supplies forward from the rear.

MASS—the revolutionary Army supply system of the mid-Twentieth Century has been developed by Department of the Army and the Logistics Research Group, to be *Responsive* to the needs of the combat commander; *Flexible* to accommodate mobility; *Dispersed* to minimize losses from enemy action; *Efficient* to ease the drain on manpower and national resources; *Effective* to insure accomplishment of mission; *Compatible* with joint operations concept; and *Expandable* for support of small or large operations.

RCA Storm-Detection System Feature of Weather Show

A weather-detection radar system which enables pilots to "see" storms and cloud formations up to 150 miles ahead was exhibited by the Radio Corporation of America at the U.S. Weather Bureau Show, recently.

The show, which features weather-detection equipment and techniques of the U.S. Weather Bureau and of industry, ended June 30 and drew some 100,000 visitors.

The RCA exhibit featured a model of the nose and cockpit of an aircraft, with the antenna of the weather radar system installed in the nose, and a radarscope, with storm picture, mounted in the cockpit. The exhibit enables visitors to observe how the antenna picks up storm formations ahead to provide the pilot with early storm warning.

The RCA AVQ-10 weather radar system already has been purchased for use in the airfleets of five U.S. and four foreign commercial airline companies, and in numerous business airplanes and other types of private aircraft.

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"Durajoint", extruded from Polyvinylchloride = PVC, was specifically compounded and designed for use between adjacent sections of concrete structures. "Durajoint" is extruded with specially designed longitudinal ridges on both sides that insure the distribution of critical pressures and enhances the holding power. "Durajoint's" extreme elasticity and excellent tear resistance allow it to succssfully handle vertical or lateral movements of masses of concrete without being sheared. "Durajoint," the 100% watertight expansion and construction joint, will successfully withstand extreme waterheads. "Durajoint" successfully replaces metallic strips, rubber or butuminous materials generally used for waterstops.

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- ✓ Lifetime expectancy of approximately 300 years
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Conservation through Suggestions

Naval Supply Depot, Seattle, Washington. NSD Seattle, employees started out the year 1956 with great enthusiasm and far surpassed the total suggestions received for the same period of time in previous years. An exemplary group of six employees in the Fiscal Department resulted in a Superior Accomplishment Group Award of $300. A total of 74 new suggestions were received for the period 1 January through 15 May. Of this total, 20 suggestions were adopted and awards amounted to $360. Estimated savings for these suggestions is $4,020.

Whiteman Air Force Base, Missouri. Captain John P. Treese, USAF, became the second Whiteman officer to submit an accepted improvement suggestion since the program started last July. Captain Treese's suggestion called for a modification of flashlights to enable B-47 observers to visually check fuses while in flight.

Fort Benning, Georgia. A busy month in suggestions and awards was reported by Fort Benning. Here is their record—a trade of $450 paid out—for savings to the government amounting to $34,779. 11 civilian and 15 military employees shared the winnings.

Camp LeJeune, North Carolina, T/Sgt. William H. Watson, USMC, 2d Marine Division, has recently been awarded a meritorious promotion for suggesting and developing special tools for more efficient operation of the automatic rifle, tanks and the master lathe converter. Performance of the master lathe converter, used in ordnance work, by developments to the base plate have increased 100 per cent. The special promotion warrant signed by the Commandant of the Marine Corps, was presented to Sgt. Watson by Colonel H. C. Cooper, commanding officer of the 2d Service Regiment.

Travis Air Force Base, California. Two airmen and five civilians recently received cash awards for accepted improvement suggestions. M/Sgt. Floyd Earle, 1501st Field Maintenance Squadron and A/2C Norman Sego, Fifth Field Maintenance Squadron, split $50. Sergeant Sego and civilian James Long devised a manifold alignment jig for use with the B-36. Airman Earle and civilian Leonard Forland devised an inner ring exhaust system bracket support. Other winners included Mrs. Jeanne Christensen, Claude Draper and Milton Messer.

White Sands Proving Ground, New Mexico. Two civilian employees, Alfred D. Baum and Irving J. Moran together with M/Sgt. Hugh T. Williams, were recent winners in the suggestion award program. Baum received $180 for his suggestion on the use of accelerometer blast deflector on the instrumentation on the Honest John launcher to prevent loss or damage to the transducers. First year savings are reported to be $6,107. Mr. Moran received $237.50 for his suggestion modifying the electrical switches on SCR-584 radars, and Sgt. Williams for his idea on improving bus transportation, an Achievement Certificate and a check for $10.

For devising a Work Simplification improvement which eliminated a large amount of overtime in handling privately-owned vehicles, with an estimated annual saving of $6,000, and for suggesting the overprinting of a packing list, which saved the Government $908 annually, Charles J. Morelli, Automotive Inspector, received cash awards totalling $225 from Colonel W. M. Gaige, Jr., Commanding Officer, Oakland Army Terminal.

Left to Right: Brig. Gen. W. J. Deyo, Commanding Officer, Pacific Transportation Terminal Command; Mr. Morelli; Colonel F. P. Hyatt, Acting Terminal Director of Operations, and Colonel Gaige.

Naval Air Station, Niagara Falls, New York. NAS personnel are working hard on a new safety beneficial suggestion program. The reason—acceptable safety suggestions will win a half-day liberty, those adopted a full day off, and the best for the month two days liberty. All in addition to regular liberty, this incentive is proving it will "bring in the ideas."

United States Army Alaska. Suggestions submitted by military and civilian personnel during the period from July 1 to December 31, 1955 resulted in an estimated first year savings of $61,000. During the period, 36 suggestions were adopted. Two outstanding ideas from a civilian employee and a soldier at the Alaska General Depot saved $6,000 and $5,000 respectively.

Naval Supply Center, Norfolk, Virginia. Daniel F. Bula, fiscal accounting clerk, is $200 richer today. He was awarded this amount by Rear Admiral J. L. Herlihy for improving accounting procedures in the Navy.

Fort Lesley J. McNair, Washington, D.C. Mr. Innis Randolph Skinner, who has been employed in the Engineer Section for 13 years, recently developed a Material Requisition form preventing duplication of orders and expediting clerical work, and was awarded $25 from the Post Commander.

Palm Beach Air Force Base, Florida. A Communications System Rack for the aircraft Ground Controlled Approach unit, recently won for M/Sgt. Lloyd Ainsworth, 1987th AACS Detachment, an Award of Achievement Certificate. Prior to his idea, it had been necessary to disconnect miles of receiver-transmitter cables every time the radar unit was moved because of change in wind direction. With Sergeant Ainsworth's new Communications Rack, installed at the rear of the GCA, all connections and cables are contained in the one panel box.

Fort Hood, Texas. Major General William N. Gillmore, recently awarded cash prizes to three Fort Hood Sergeants for improvement

suggestions. SP3 Antonio B. Pizzate, 4005th SU received $25 for his idea simplifying the preparation of identification privilege cards. M/Sgt. Robert A. Witt, 53rd Signal Battalion received $15 for his suggestion to correct a safety hazard in rehabilitating the barracks, and third place prize of $10 went to SP1 Class Charles D. Vickers, 4005th SU for designing a tool for removing the tail rotor from Army helicopters.

Naval Air Station, Alameda, California. Placing first in the top 10 BuAer activities in the annual suggestion program, NAS Alameda during the first seven months of fiscal year 1955 awarded $15,885 to its employees in return for an estimated annual savings of $420,174. Several recent winners are: Armando Mercado $200, for his suggestion pertaining to "Training Edge Cut-Out Jig"; I. I. Barber $300, for his idea to improve "Replacement of Upper and Lower Forward Spar Caps on AD Outboard Wing Panels"; and Willie C. Graves $300, for a "Grinding Wing Fold Cylinder." Personnel operations are streamlined with a suggestion by Ship's Clerk C. R. Madison, which are reported to be saving thousands of man-hours annually.

Reese Air Force Base, Lubbock, Texas. Mr. John M. Glenn of the 3505th Field Maintenance Squadron is an "idea man" with three recent improvement suggestions. A landing gear cylinder clamp, a clamp for nose gear struts, and a clamp for holding wing flap struts in a vise, will afford quite a substantial savings each year to the base.

Seattle Army Terminal, Seattle, Washington. A Work Simplification Program costing but $519.25 has netted a savings of $22,556.13 during the past year. In addition to monetary savings, many hours of time with increased efficiency in operations have resulted from the training. Miss Mary E. Krininger of Cargo Operations Division, and a recent graduate, collected $110 for an idea that was a result of her participation. A recent winner in the Suggestion Program was Lyman L. Rogers, who received $270 for devising an improved method of withdrawing gas from autos being processed for overseas shipment which will save about $4,600 the first year and reduce the present fire hazard.

Andersen Air Force Base, APO 334, San Francisco. Colonel F. E. Marek, USAF, base commander recently presented a check for $25 to M/Sgt. L. C. Cecil for an idea to change crankcase seals on R-2600 engines without removal of the engine, which he submitted more than a year ago when stationed at Offutt Air Force Base. The idea was a good one, and the check followed Sergeant Cecil to his new station.

U. S. Naval Supply Depot, Scotia, New York. Mr. John McKeon, recently was awarded the highest cash award ever made at the Depot for his idea for a reduction in the volume of ships navigational information requiring preparation, storage, and shipment. The amount, $300, less withholding tax, will be added incentive to other Depot employees.

Attend Exchange Conference

The first world-wide exchange conference in a decade has just been completed in New York. Over 100 officers and key civilian personnel representing every major domestic and oversea Army and Air Force command and the Army Technical Services, together with the five A&AFES regional officers and their staffs met at the Hotel Sheraton-McAlpin with Major General H. L. Peckham, Chief, Army and Air Force Exchange Service and his staff.

The primary purpose of the conference was to discuss the new world-wide fiscal integration of all Army and Air Force Exchanges directed by D/A Circular No. 60-1/AFL 147-2, 13 April 1956, which called for "uniformity and business like coordination of operating policies and fiscal controls; a strong flexible service operated along commercial lines and responsive to command and logistic requirements; substantially uniform exchange services and prices and within each service equitable welfare benefits to servicemen, wherever stationed."

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For more facts request No. 29 on reply card

By George K. Shearer

LEST WE EXPECT TOO MUCH FROM AUTOMATION

YOU AND I, along with a few million others, have had a new, magical word tossed into our daily conversations, our trade magazines, and even into our political oratory. Automation. Just as the "horesless carriage" was to make the horse an obsolescent quadruped so, it would seem, should automation make all but a handful of us superfluous bipeds.

There was no question of horses becoming surplus to requirements —that could be handled by regulating breeding. There is not supposed to be a problem of surplus mankind because, paradoxically, the less work there is to be for the individual, the more work there is to be for the many. That is welcome news because it might be slightly more difficult to control breeding among bipeds than among quadrupeds.

What is Automation? Don't look to this article for a forthright answer. It isn't in the dictionary, thesaurus, or Bible. It is still on the tips of tongues and nibs of pens. It is described, depending on where you read, as being somewhere within the limits of "push-button everything" to a scientific wonderland of "we'll work out the details later". It seems, after reading countless articles on the subject, that not two proponents agree on an exact definition even though all seem to agree on results. The chief result being that we, the people, will have an almost limitless portion of our spans of years (which are to increase and increase) to apply to the pursuit of happiness, spending money which is to accrue to us in vast amounts, for yet undreamed of gadgets. In the newspapers recently one economist was quoted as saying the average American family income would reach $25,000.00 a year. Now, if everything is to be produced by automation, and automatic production generally reduces costs, it is evident there will be a great boom in building (by automation) to provide us with storage room for the things we'll buy; and that buying will provide an ever-expanding market for more goods because living, or acquisition, costs should not go up. However, unless the old laws of economics are repealed and new ones enacted, don't expect to have any more left out of your $25,000.00 a year than you now have of your $4,000.00 or $5,000.00 a year. Proportionately, that is. The pursuits you will pursue in your added leisure are going to have to be budgeted, even as now.

It has long been a precept of good management that the most efficient work-force is one that functions as a team. It is known that such a work-force frequently surpasses what would be a total of individual efforts. In time of need such a group literally rises above itself in accomplishment. It is admitted that proper planning will produce a team of machines that will operate with routine, repetitive perfection, but that team will never "rise above itself" for any need.

It has been said that the Secretary will never be replaced by a machine. The same can be said about many categories of human employment. A machine may someday sell you an automobile, but how will it persuade you to buy a Ford instead of a Chevrolet? What will Automation do? The one big thing we can expect is reduction or elimination of human handling of product, which isn't a new aim of business. It has long been recognized that mere handling of a product adds to its cost but not to its value. So, already much effort has been put into reducing handling costs. From this angle, then, automation is nothing new except for application.

Compare the old-time steel mill with one that has been developed in the last few years. In the old rolling-shop there were a passer and a catcher for each set of rolls. The passer introduced the steel into a groove in the rolls which reduced the steel billet or bar to a specific size, and discharged it on the opposite side of the rolls. The catcher caught the piece of steel when it came through and returned it to the passer by the top rolls. This passing back and forth, from man to man, went on and on through a multiple number of rolls until the desired size and shape was reached. In today's rolling-shop the steel is sent to the first roll by trough and from there on the passing back and forth is done automatically until the desired size and shape is finally discharged from the last roll.

That was progress. Actually, we can say that Automation is the natural progressive manner of accomplishing the difficult easier; of speeding up the slow by applying special technique; of substituting mechanical rhythmic motions for slow or burdensome human motions; of substituting mechanical connections between and in operations for human connection. It is not new, nor should it be frightening. The things we are enjoying today did not come to us full-flowered. They came to us in manners not identified by any specific name, but apparently this method of progress is now to be labeled Automation. Automatic processes are going to be coupled to other automatic processes to achieve greater automatism. That result we will call AUTOMATION.

Increased Financial Management Effectiveness Through Internal Review

In consonance with current governmental emphasis toward effecting economy of operations and in compliance with prescribed directives, NASD Philadelphia recently established an Internal Review Division. In the short span of 9 months since its establishment a saving of 6,560 manhours totalling $11,545, directly attributable to the efforts of this new component of NASD Philadelphia has been realized.

The concept of Internal Review is neither new nor unique but is a development arising from the expansion and increased complexity of the administrative and financial aspects of government as well as industrial operations. At NASD Philadelphia, Internal Review provides management with an additional control tool for objective appraisal and evaluation of financial operations and their results. At NASD, Internal Review acts as the "eyes and ears" of the activity in the area of financial management. A "Handbook of Internal Review Functions" prepared by the Internal Review Division acts as the governing NASD guideline for accomplishing the mission of this component of NASD.

Basically, Internal Reviews at NASD are conducted with two broad objectives in view, namely, assurance that personnel are operating under a suitably designed system and critical appraisal and reappraisal of the adequacy of the operational system. However, the primary function is the review of adequacy, accuracy, and effectiveness of all financial operations in NASD. This incldes insuring compliance with existing and prescribed statutes, regulations, and procedures as well as verification on a test check basis of accounting transactions from original source documents to final reports and returns in order to insure the legality, propriety and validity of such obligations and charges to specific appropriations and segments thereof. Upon completion of any particular audit, reports disclosing the status of operations appraised and recommendations for remedial action are submitted to management. The Internal Review Division at NASD also provides Command assistance and liaison to visiting external inspection and audit groups and parties (Navy Comptroller, Navy Regional Acounts Office, Inspector General of the Supply Corps, General Accounting Office, etc.) which on a spot or recurring basis conduct analyses and inspections of various aspects of the financial operations of NASD.

The success of the Internal Review Program at NASD can be mainly attributed to the active acceptance and support of the program by management officials and operating personnel and the organizational placement of the function within the Planning Department thus permitting more effective use of the functions as a "tool" for managerial planning and Comptrollership concepts. Effective Internal Review depends to a great extent upon its independence to cross numerous operational, administrative and functional lines of control. This can be best accomplished within the organizational scope of the Planning Department at NASD.

It is important to emphasize that Internal Review responsibilities should not encompass the approval of operating procedures or systems prior to their installation and implementation. This is a "gray" area of functional responsibility which is correctly applicable to the Management Control Division of the Planning Department. There should be a distinct delineation of responsibility in this area of review as opposed to Internal Audit.

Primarily, Internal Review as a by-product of its audits critically appraises compliance and conformance to the procedure or system promulgated by Management Control. Internal Review should not correct the deficiencies uncovered whether procedural or operational rather they should be revealed and reported to proper levels of organizational authority for corrective action. Recommendations for all discrepancies are unnecessary since in many instances solutions to the defects which cause them are properly the responsibility of operating personnel or management engineers based on their scope or importance. The revelation of discrepancies to top management, as specific items or trends, enables expeditious analyses and early corrective action to be effected by the cognizant level of management. The early detection and reporting of discrepancies is of particular significance to any successful Internal Review Program.

The NASD Program operates on a schedule of reviews which covers a six month range of proposed and planned work. The schedule is flexible, however, dependent on effort diverted to special review required on a "situation" or "emergency" basis. The planned audit program is coordinated with other management analyses to provide for internal reviews to closely follow in the same specific work areas or operations. In this way deficiencies in organizational and procedural work aspects are carefully scrutinized almost concurrently with financial aspects. Initial success of the Internal Review Program at NASD has indicated the feasibility of a progressive increase in scope of operations in this area of financial management effectiveness.

Management Scientist Announces International Meeting for October

Announcement has been made by General Chairman George Kozmetsky that the third annual international meeting of The Institute of Management Sciences will be held at the Statler Hotel in Los Angeles on October 18 and 19, 1956.

Last year, the annual conference, which was held in New York, was attended by more than 600 business executives, operations research technicians, and other scientists. Plans are already formulated to accommodate a considerable increase in attendance this year. Program plans for this unique national group, which concerns itself with application of the advanced sciences to business and industrial management, include the presentation of technical papers on latest developments in the field.

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ELECTRONIC COMPUTER

Monroe Calculating Machine Company. The Electronics Division producers of MONROBOT VI, presently being delivered to the Air Research and Development Command, have an interesting brochure available to interested organizations and individuals.

For more facts request No. 1 on reply card

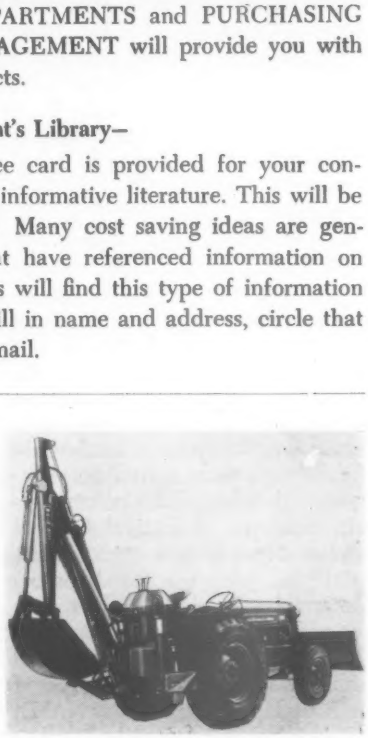
AIRCRAFT RUNWAY CLEANER

U.S. Hoffman Machinery Corporation. The world's largest vacuum cleaner is in use at Anacostia Naval Air Station, and proving to be a maintenance-saver. It is reported that several million dollars are spent annually for engine repairs and replacements due to foreign material being "sucked in" through jet air-scoops. Complete information is available without obligation from our library.

For more facts request No. 2 on reply card

VERSATILE TRACTOR

Wain-Roy Corporation (See Cut). This corporation has recently announced the manufacture of a combination back-hoe and back-fill blade attachment for the International 300 tractor. The handy, low-cost combination is engineered to handle an amazing number of different trenching jobs, bell hole and



foundation excavation, plus backfilling, leveling, and grading. This self-contained unit can be removed or attached in less than 30 minutes. We shall be glad to send you more descriptive information and price guide.

For more facts request No. 3 on reply card

NEW FIRE EXTINGUISHER

Stop-Fire, Incorporated. The need for a small, light-weight, easily operated and maintained fire extinguisher for protection against Class A fires in aircraft is filled by an entirely new 1½ quart hand portable water-solution type, loaded stream fire extinguisher. Designated the Stop-Fire AT-22-A, the new unit is approved by Underwriters' Laboratories and other aviation fire protection groups. Manufactured by the makers of the Type A-20, now standard on U. S. Air Force aircraft for control of Class B and C in-flight cabin fires, the new extinguisher can be a valuable piece of equipment.

For more facts request No. 4 on reply card

REMOVABLE TRAFFIC PAINT

Traffic Safety Supply Company. "TEMLINE" the new removable type traffic paint, is filling a long-existing need for traffic or aisle paint that can be removed completely at will. Removable TEMLINE may be applied without special equipment with either spray or brush, and will last as needed up to 5 months. Available in three colors, this thoroughly tested paint may be seen or demonstrated by contacting our publication.

For more facts request No. 5 on reply card

EXPOSURE RADIATION DETECTOR

The Pacific Transducer Corporation (See Cut). A new Major Exposure Radiation Detector for per-

sonnel use has recently been announced and available for shipment. The RADAD Dosimeter provides both cumulative measurement and instantaneous reading of dangerous amounts of exposure to radiation of gamma rays. The detector is carried in the pocket or placed in any convenient location. When the dosage approaches the limit, the beads lose their charge and drop to the bottom of the chamber out of sight, below the metal ferrule. The unit has an indefinite life, as there are not any wearing parts, nor does it require any battery or charging device of

any kind. It is recharged by shaking the tube.

For more facts request No. 6 on reply card

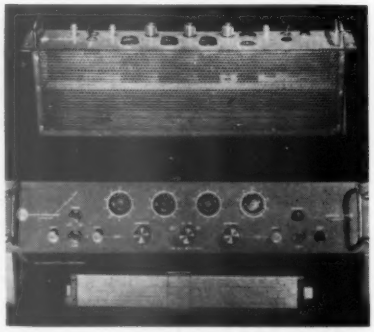
SUBMERSIBLE PUMP MOTOR

Leland Electric Company (American Machine & Foundry Company). A completely submersible explosion-proof pump motor is now being produced, designed to overcome vapor-lock problems generally associated with positive displacement suction pumping systems. The increased use of higher-octane, more volatile fuels has greatly intensified vapor-lock difficulties, particularly in installations operating in warmer areas or at higher altitudes. More complete information, as well as a catalog showing Leland's complete line of motors, alternators, generators and rotating electrical aircraft products, is available without obligation.

For more facts request No. 7 on reply card

MODEL 210 DIGITAL TIMER

Hupp Instru/mation Company (See Cut). The Model 210, now in production, is a compact four decade, electronic counting instrument; designed for rack mounting or portable use. Glow-tube decades and simplified circuitry are em-



ployed to achieve high accuracy and extreme reliability in a volume less than 1/5 cubic foot. The panel dimensions are 19 x 3½ inches. The 210 may be used as an electronic counter at rates as high as 60,000 cps. Time is indicated in units of 100 or 1000 microseconds (10 microsecond increments optional on later models). Maximum indicated time using one-millisecond unit is ten seconds. More technical information is available on request.

For more facts request No. 8 on reply card

NEW WATER CONDITIONER

The Packard Manufacturing Company. A new water conditioner that eliminates and prevents scale and corrosion formation in boilers and water systems without the use of chemicals, employs nuclear physics principles to the effective treatment of industrial water problems. Completely guaranteed, the Packard Water Conditioner, for use on boilers, air conditioning and refrigerating systems, laundries and other applications, is manufactured in several sizes. We shall be glad to forward you more specific information and prices on this new piece of equipment designed to save dollars for all users.

For more facts request No. 9 on reply card

GYROL FLUID DRIVE

American Blower Corporation. Aiming at the lower horsepower users in the machine tool, fabricating and production machinery industries and the Armed Forces, American Blower Corporation, has developed a new series of Class 2 adjustable speed Gyrol fluid drives for 1 through 25 hp applications. The new units are especially well suited for automated installations where minimum maintenance, automatic speed adjustment, and positively uniform accuracy of repeat speed settings are prime considerations. Self-contained, maximum life for this drive is insured. Complete specifications are available without obligation.

For more facts request No. 10 on reply card

THE BELCO CONVERTER

Belco Ball Bearing Faucet Washer (Division of Miller Manufacturing Company). To ease the installation of the world famous BELCO wear-proof and leak-proof faucet washer, the new Belco Converter to shorten valve stems, is available to interested organizations. Priced within reach of every installation, the conversion machine has a place in every public works and engineer shop. Information is available on how your organization can eliminate maintenance problems of dripping faucets and save in wasted water many times the cost of this equipment.

For more facts request No. 11 on reply card

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Ullman Products Corporation. This new ingenious, precision engineered mirror-magnet combination which fits on to any rifle or revolver, simplifies inspection and cleaning by revealing the bore clearly and accurately. For the first time, MIRRO-MAG enables the user to detect the smallest speck of dust or dirt, the slightest trace of oil or foreign matter in the barrel. Small enough to fit into the pocket, this precision instrument is available for only $1.95 post paid, and will find many additional uses for the owner. Manufactured by leaders in their field for over twenty-five years, we know you will be interested in this new product.

For more facts request No. 12 on reply card

SUPERVISORY CONTROL EQUIPMENT

Motorola Incorporated (Communications and Electronics Division). A new supervisory control system, called Type DOS-3, has been announced by Motorola. According to the manufacturer, this system is designed to provide reliable, economical, and compact centralized control. With Type DOS-3 equipment, one operator can supervise and control many valves, pumps, motors, generators or other devices which can be operated electrically. The new equipment is available in two ultimate capacities, 25 and 50 points. Specific and more technical information will be forwarded upon request.

For more facts request No. 13 on reply card

NEW CHROME CLEANER

Rooto Corporation. This new chrome cleaner eliminates all hard scrubbing and rubbing—it literally sponges rust away. Just sprinkle the cleaner on a moist sponge or coarse cloth and wipe the rust away. Here is another top-quality product manufactured by the Rooto Corporation, which removes rust and grease from all equipment with an unheard of ease. Are you interested in banishing the old chore of scrubbing rust? If so, circle our product card and we shall be glad to send you additional information.

For more facts request No. 14 on reply card

ENCYCLOPAEDIA BRITANNICA

This time-honored organization has recently published a new illustrated booklet about Britannica, containing scores of magnificent illustrations, many in full color, and over 200 subjects; also information about the Britannica Book-a-Month Payment Plan. Because of the interest generated by our readers from ARMED FORCES MANAGEMENT Book Reviews, Encyclopaedia Britannica has made this booklet available without cost or obligation to our subscribers. A copy will be mailed to you immediately upon receipt of your request.

For more facts request No. 15 on reply card

AUTOPOWER

Safe Flight Instrument Corporation. A new development in the field of automatic controls which operate aircraft engine throttles during the landing approach, has been perfected and ready for installation. With the new system, named "Autopower", an airplane can be made to climb, glide or maintain level flight as required, with automatic adjustment of the required engine power. Noted for their Stall Warning Device which is standard equipment on many commercial and military aircraft, and their "Speed Control" system, an electrical lift detector designed to advise a pilot when his aircraft is at the correct speed during take-off and landing, Autopower is destined to take its rightful place in aircraft automation. A complete brochure is available without cost or obligation.

For more facts request No. 16 on reply card

FIRE FIGHTING PUMPER KIT

H. S. Watson Company. A new fire fighting pumper kit for pick-up trucks which takes its motive power from a power take-off shaft coming out of the rear end of the truck just under the body. The pump develops up to 350 lbs. of pressure, to make a penetrating fog spray, that easily snuffs out a blaze. With this type spray, the 50 to 300 gallons of water that a light truck can carry, will go a long way. The new kit most certainly is a "must" for organizations and it is now possible to "Carry Protection Wherever You Go." The available illustrated brochure which is available will bring you additional details.

For more facts request No. 17 on reply card

MINIATURE RECORDER

Dictaphone Corporation. A portable tape recorder no bigger than a small movie camera and weighing only slightly more than 2½ pounds has just been announced by Dictaphone Corporation. The Dictet recorder is a precision instrument for mobile voice recording. It is primarily an on-the-spot recorder that can be used anywhere. Battery-powered, a full hour's recording on magazine-loaded magnetic tape, makes this completely transistorized amplifier a truly "Portable Memory". Small plug-in attachments quickly convert the recorder into a transcribing machine. Recording is erased automatically by a separate magnet within the machine, making tapes endlessly reusable. ARMED FORCES MANAGEMENT Library, will be pleased to forward you complete specifications.

For more facts request No. 18 on reply card

HYDROMAT ASPHALT LINERS

W. R. Meadows Incorporated. A new product specifically designed to provide a practical method of controlling erosion and water-seepage in irrigation ditches, canals, reservoirs, storage ponds, pools, etc., are quickly and easily installed by untrained labor without special tools or equipment. Extremely flexible with an asphalt and fibre core sealed under heat and pressure between two liners of asphalt saturated kraft to which is bonded an independent weather coating, "Hydromat" will not rot or decay and lasts indefinitely. A descriptive, illustrated booklet is available to construction officials.

For more facts request No. 19 on reply card

"DAY-GLO COLORS"

Switzer Brothers, Incorporated. The vital importance of high-visibility colors were recently demonstrated in the rescue of two lost aircraft, one in Antarctica and the other in the jungles of Venezuela. A new 37-page OTS publication, PB 121016, is supplied by the U. S. Dept. of Commerce, Washington 25, D.C., for $1.25. This is available WITHOUT CHARGE to military personnel and government contractors from Switzer Brothers. Here is your opportunity to see the results of the four fluorescent colors

employed in air-sea color tests. We shall be glad to forward a copy of this information booklet upon your request.

For more facts request No. 20 on reply card

POCKET-SIZE MANUAL

Allis-Chalmers Corporation. A pocket-size review of the earth-moving and construction machinery manufactured by the Allis-Chalmers Manufacturing Company's Construction Machinery Division is now available from the company's Tractor Group.

The two-color booklet (MS-1107) presents the line and matched allied equipment through pictures of each model tractor, motor grader, motor and pull-type scraper, and power unit, all briefly and concisely described to permit the reader to review the entire line in a minimum of reading time.

For more facts request No. 21 on reply card

V.I.P. BRIEF CASE

Olympic Luggage Corp. Attaché cases, sometimes called "V.I.P. Brief Cases," have become very popular in the past several years.

Now, Olympic Luggage Corp. has combined several new ideas with the most popular features of older models in the new Olympic Attaché.

A detachable portfolio, divided into five spacious compartments, fits into the top of the new case and may be removed by the half-turn of a concealed fastener. This feature is especially attractive to business executives on flying trips to distant cities. The case may be left in a baggage locker while only the portfolio is carried during the business day.

Another outstanding feature is the dual purpose divider panel. It will serve as a writing desk while en route, and it conceals clothing and personal items which are carried in the lower compartment.

Finished in virtually scuff-proof Tolex, a top quality, heavy-duty vinyl plastic; the Olympic Attaché case will not fade, crack or peel. Easily cleaned with a damp cloth, it is available in brown or saddle russet—with burnished brass hardware.

For more facts request No. 22 on reply card

ALL-PURPOSE HAT AND COAT RACKS

Vogel-Peterson Company. Snap-over hooks to replace hangers give double capacity in same area. Checkerette racks can be set up or taken down in a minute without nuts, bolts, or screws, are strongly built of welded heavy gauge steel.

For more facts request No. 23 on reply card

BELCO REPLACEMENT FAUCET STEMS

Miller Manufacturing Company. Leaking compression type faucets, lost water and excessive maintenance costs are gone forever with the installation of Belco ball bearing replacement stems, complete with bibb washers. The bibb washer is only under compression and is not subject to cutting or grinding action.

For more facts request No. 24 on reply card

MUTUAL INVESTMENT FUND FACTS

Brown, Madeira, and Company. This company, specializing in mutual investment funds, will send, without obligation, facts about conservative, middle-of-the-road, and aggressive types of investments and mutual funds.

For more facts request No. 25 on reply card

VISUAL CONTROL BOARD

Wassell Organization, Inc. Produc-trol not only schedules but automatically checks with time, line, and color control, has low original and upkeep cost.

For more facts request No. 26 on reply card

COMMON STOCK INVESTMENT

Hamilton Management Corp. Through Hamilton Funds, Inc., a managed common stock investment fund, this firm offers lump sum or monthly investment plans to fit any budget. Interested persons can inquire without obligation. Firm recently declared another quarterly dividend.

For more facts request No. 27 on reply card

Checkerette®
ALL-PURPOSE HAT AND COAT RACKS

Large Capacity in Small Space

Checkerettes go wherever needed, can be set up or taken down in a minute without nuts, bolts or tools. Strongly built of welded heavy gauge steel box shapes, they stand rigid under any load—never sag, sway or wobble. When not needed they can be stored away like folding chairs. They have more capacity for size—a single bar, 4 ft. unit (above, rear) provides 2 hat shelves and holds 24 coats on hangers (or 32 on snap-over coat hooks); the double bar unit, with wider hat shelves takes 48 coats on hanger (or 64 on hooks). Shelves can be assembled at heights for children, adults or at top for long gowns, or robes. These are smart, modern units that give more capacity in less space. 3 ft. or 4 ft. units finished in gray baked enamel.

Write for Circular. CT-455

VOGEL-PETERSON CO.
"The Coat Rack People"
1121 WEST 37TH STREET, CHICAGO 9, ILLINOIS

For more facts request No. 23 on reply card

VISUAL MANAGEMENT CONTROL

Graphic Systems. This New York firm invites men interested in efficient management to get things done with Boardmaster Visual control which gives a graphic picture of operations, spotlighted in color, saves time, money, and stops errors.

For more facts request No. 28 on reply card

SACRO-EASE POSTURE CUSHIONS

McCarty Manufacturing Company. National Safety Council officials rate posture a vital factor in accident prevention. Back muscles are never under painful tension when posture cushions available for office, home, hospital, and all conventional and sports cars are used. Sit relaxed yet in perfect posture for many hours without discomfort.

For more facts request No. 29 on reply card

New York Chapter. One of the was held on 13 June in the air-conditioned Service Dining Room, The New York Times, 229 West 43rd Street, New York City. Dinner was served at 6:30, and the meeting began at 8:00. Rear Admiral William L. Knickerbocker, whose nomination as Executive Director of the Military Medical Supply was approved by the Secretary of Defense in April, was the guest speaker. Admiral Knickerbocker who is the Commanding Officer, U.S. Naval Supply Activities, New York, discussed the "Single Manager System."

The Great Salt Lake Chapter. One Slip Stick Equals Pie Squared, —Mrs. Millard C. Snyder celebrates Armed Forces week by putting "Engineering Time Standards" to

work in her kitchen. Mrs. Snyder was one of many housewives entertained at a recent meeting of the Great Salt Lake Chapter, Armed Forces Management Association. In a skit where husbands took the role of home management consultants an attempt was made to apply management engineering methods to housekeeping chores.

Aberdeen Proving Ground Chapter—Henry N. Marsh, deputy assistant Secretary of the Army (Logistics and Research and Development) was the guest speaker at the first quarterly dinner-meeting of the Aberdeen Proving Ground chapter of the Armed Forces Management Association on June 7.

Speaking on "Management in the Department of the Army", the sixty-three-year-old chemist drew on years of industrial management experience and an association with the military establishment which was climaxed in March, 1955, with his appointment to his present position.

Mr. Marsh, now on leave of absence from Hercules Powder Co., of Wilmington, Del., has been responsible for development of rocket propellents which started with the "Bazooka" in World WarII, and now include booster and propellent charges for guided missiles such as the NIKE, and artillery weapon HONEST JOHN.

As General Chairman of the Technical Division and Committees of the American Ordnance Association, he has served as Ordnance consultant to the Armed Services. For the past three years he has served as a member of the Technical Advisory Group to the Air Force Center at Eglin Air Force Base, Fla. In 1950, Mr. Marsh was a consultant to the Secretary of Defense assigned to the Military Production and Supply Board of the North Atlantic Treaty Organization to survey the capacities for producing explosives, propellants and artillery ammunition in the NATO Countries.

The dinner meeting held in the Main Officers Mess at the Proving Ground at 7 o'clock, preceded by a general business meeting. Col. R. P. Wilson, chapter president, outlined the activities for the coming year, and introduced the newly appointed leaders for the six divisional subject areas.

Fort Benning Chapter Mr. W. L. Ector, Superintendent of the Columbus Division of the Central of Georgia Railroad, was a recent guest speaker at the Armed Forces Management Association. Editor's note: We are reprinting Mr. Ector's address, as we feel it will be most interesting to all of our readers.

Management in Railroad Transportation

By W. L. Ector,
Superintendent Columbus Division, Central of Georgia Railway

I will try to give you a brief summary of railroading as I have learned it in my long experience with the Central of Georgia Railway which I have served for forty-five years in various capacities.

In my starting days on the railroad, we did not own a single steel underframe car. Passenger cars were open vestibule coaches, most of which had oil or gas lights and stoves for heating purposes. Motive power consisted of small steam locomotives that were hand-fired. In the early 1920's, the Central of Georgia was operating in and out of Columbus twenty-six passenger train schedules daily. It now operates only six. The trend today is for passengers to use other means of transportation. Other forms of transportation have cut deep into potential railroad traffic, making it absolutely necessary that the industry practice every known economy to continue to exist. I would not attempt to say that we should go back to pioneer days or that railroads should be permitted to handle all traffic, eliminating competition. We are living in a very progressive age and, certainly, no one would want to block progress. I will say, however, that from an economic standpoint, compared with other forms of transportation, the railroads are in the best position to serve this country, and I am sure they will continue in this position. To illustrate, we have through freight trains operating between Columbus and Birmingham,

a distance of 154 miles, that handle 6500 tons and make the run in five to six hours with a five-man crew. How many trucks would it take to handle that amount of tonnage?

In March 1956 a survey made by General James A. Van Fleet (Ret.) "Rail Transport and The Winning of Wars" reported: "In any future national defense emergency, as in all past military efforts since railroads came into being, we shall without doubt have imperative need for the quantity and type of transport which only railroads can supply. Therefore, we have now and always will have vital need for strong, vigorous, progressive railroads, with reserves of traffic capacity and trained manpower upon which the armed forces can draw for their own combat and strategic requirements. To maintain such a rail plant in readiness, it must be used in peacetime".

The General reports Secretary of Defense Charles E. Wilson as saying that our primary reliance in time of emergency is on the common carrier because of its invested capital, trained personnel, familiarity with the area of service as well as experience and capacity to expand in meeting military requirements. He says World Wars I and II and the Korean war showed that the carriers unfailingly response we must give a climate in which the carrier can meet the responsibility. General Van Fleet concludes by saying: "We must, therefore, take care to see that these carriers are kept strong, vigorous, and progressive. From my own war time experience, I know that measures to insure this can be neglected or deferred only at grave peril to our national security and survival."

These are troublesome times, and the responsibility to keep our industry strong for national defense weighs heavily on railroad management. I know the management of the railroads has gone far toward keeping our property in the best condition possible. In the past four years, the Central of Georgia has completely dieselized. This form of motive power is much more flexible than the former "iron horse". Units can be added or taken away as needed. As many as four units can be coupled and operated as one unit of power. All units will respond to the actions of the lead unit, both in power and braking, and, therefore, only two men on the lead unit constitute all the engine force required. Diesel locomotives have saved railroads untold sums of money in maintenance and operating expenses as well as in availability for motive power.

Railroad operation stems from executive offices at home base, and it is customary that its functions be split up in operating divisions. I will attempt to outline the Columbus division, of which I am superintendent. This division consists of approximately 700 miles of main line track and four major yards. We have an assistant superintendent, and the division is subdivided into various departments, with a head in charge of each respective department. The heads of these various departments, with their subordinates, are directly responsible for the successful operation of the division.

Our railroad requires that each new employee have the equivalent of a high school education. This we deem necessary because of the small number of employees who demonstrate qualities of leadership and the ability to accept responsibility requisite in supervisory positions. Such positions require more ability to lead than actual "know-how". It is not so much what one man can do, but what he can get done and keep good relations between employer and employed. We have always been able to fill our supervisory positions from our ranks instead of having to seek men outside. We encourage our men to improve their knowledge so that they will be prepared to accept higher positions involving the acceptance of more responsibility.

Safety is paramount in the mind of every railroad worker. We think you are safer on a passenger train than in your own home. Serious mistakes or rule violations could be fatal as well as very costly. Therefore, division officers are required to make a given number of various types of efficiency checks each month to see that train service employees comply with all operating rules and special instructions. Violations observed are immediately investigated formally and disciplinary action taken where necessary. We are very proud of the fact that we have gone through four and one-half months on our division this year with only one reportable personal injury.

Close supervision of railroad operation must go on twenty-four hours each day so that traffic may be moved in a reasonable length of time, avoiding terminal delays and giving patrons the best service possible.

Terminal operation is very complicated. Competent personnel are required to insure traffic not being delayed. Empty equipment must be available at points where needed. Surplus equipment must be eliminated, as cars on railroad cost 10c per hour or $2.40 per day. Operating costs are very heavy in terminals. It costs approximately 30c per minute to work a switch engine and, therefore, yard supervisors must know that engine assignments are adequate, but that no surplus engines are worked.

Railroads have no material things to offer. They are strictly a service organization. It is their policy to solicit constructive criticism and the friendship of all people. They take a tremendous interest in the territories they serve. For instance, during the past few years large industrial developments have come to the South and many of these were secured through the efforts of the railway's industrial developments. Thus, this section of the country has been greatly benefited as well as railways aided in their fight for survival.

In conclusion, as a railway employee who loves the industry, I like to think of a remark I recently read that was made by Winston Churchill: "Victory in the Second World War," he said, "hinged on 'a battle of transportation'." Neither this country's armed forces nor its railways have ever fallen down in times of emergency, and, gentlemen, if and when another emergency faces us, we will not fail then.

• The Army stands shoulder to shoulder with the armies of our allies, on constant guard against any aggressive move anywhere in the world.

Book Reviews

by D. D. Corrigan

"ENCYCLOPAEDIA BRITANNICA," 1956 Edition, 24 Volumes.

WHY?

This is the fourth article to appear on the Encyclopaedia Britannica, concluding a series of reviews on this set of encyclopaedia.

Since the beginning of mankind and down through the ages, man has been plagued with one question—"Why?" This search, accompanied by an insatiable curiosity, has beckoned to Columbus, Galileo, Copernicus, Einstein, Hannibal, Freud and all who have contributed to the history of the world by exploration, building of cities, conquests, religions, advances in all sciences, erecting educational facilities, or in one word, to a quest for KNOWLEDGE.

A child learns about life by asking, "Where did I come from?" "Why is the sky blue?" "What is measles?" "Where is God?" The cycle of life is ended by the dying man's questions, "What is happiness?" "Why do I suffer and sorrow?" "Where is death?"

From Greek mythology comes the parable of this ever searching quest for enlightenment. Theseus slew the Minotaur (superstition, ignorance) and was led out of the labyrinth to freedom and understanding by following the thread that Ariadne had left for him.

In the Twentieth Century how does one find the answer to why, where, when, who? How does one follow the thread of Ariadne to knowledge? No more can a boy learn just from the experiences of his father, or from the Council of Elders, or from legends handed down from generation to generation. Schools, colleges, universities only begin to acquaint and open the mind to greater paths of wisdom. The history of the human race has become long and complicated. From simple beginnings, advances in all fields and cultures has added to the complexity of understanding. The written word, carefully documented and accurately descriptive, supplies the answer to man's search for knowledge.

A set of reference books, an encyclopedia, should be owned and used by every family. Day-to-day questions are answered such as "What is salt? gravity? hypnosis?," and larger dimensions are explored such as "What is democracy? automation? a guided missile? electronics?" Management conscious men will find comprehensive coverage of subjects on management, labor, personnel, psychology, supervision. Members of the Armed Forces, perhaps on the move more than most people, should feel the need and importance of the value of an encylopedia. A frequent change in children's schools, different assignments, and changes of location can be co-ordinated, balanced and harmonized by owning the Encyclopaedia Britannica, for there is no finer set. Only the best should suffice, and Britannica offers the most complete, accurate available source of information.

On the bookshelves of most American homes can be found the Bible, a dictionary left over from college days, "How to Play the Piano in 12 Easy Lessons," "Gone With the Wind," "War and Peace," a one volume Shakespeare, and several assorted current books. But often as not, no set of encyclopedia.

The expense of such a set must of course be considered. Britannica offers a payment plan whereby the entire set is delivered, but is paid for on a book-a-month method, easing the budget. Where is the husband who does not own a fairly new car, sports equipment, a set of tools, and a camera? Where is the housewife who does not consider a washing machine, new spring outfit, television, and kitchen gadgets a necessity rather than a luxury? Where is the business executive who does not travel in the best of style and eats where cuisine is of the utmost?

The average family is more than adequately clothed, their recreation well planned, their morals watched over, and is receiving good medical attention, but are these people adequately informed? Is it not as important to feed the mind as well as the appetite? Mental hunger must be assuaged along with physical activities.

The latest edition of the Encyclopaedia Brittanica contains over 3 million words rewritten or revised. These are countless index changes and many new illustrations. Of the over 4000 revised articles some of the important changes are in International Relations, military, history, mathematics, and physics. A search for education and knowledge leads one to the complete reference work — the Encyclopaedia Britannica.

If Your 'Chute Doesn't Work

"PARATROOPER," by Lt. Col. Francis X. Bradley and Lt. Col. H. Glen Wood (Military Services Publishing Company, $3.50).

The eye as well as the mind will be pleased by this fine edition describing the story of the paratroopers, written by two men who are Regular Army Officers and also paratroopers. For this is a book of pictures, mainly official photographs taken by U. S. Army and U. S. Air Force photographers. Many were taken by paratroopers in action and undergoing actual jumps, giving a unique look at moments that otherwise could not have been recorded.

There is a narrative text that accompanies the pictures, giving a concise understanding of what it means to be in this unit. The words used are simple, to the point, and yet express exactly what needs to be said. The pictures are exciting, full of action, and give an accurate account of all phases of this airborne life.

The photographs start with the training, and show the physical build up necessary for the student. Rugged and ruthless, the training and exercises keep the trainee in tip-top condition. He never walks, but always is running; to the latrine, or for a drink of water. The instructors are tough but efficient and able. They always demonstrate how to do something, as well as oral instructions.

Pictures tell the story of the jump tower, the first jump, the unit, and the most important of equipments

–the parachute. World War II had the paratrooper in Italy, Sicily, France, Belgium, Holland, Germany, the Pacific and then the paratrooper was in Korea.

Don't miss this colorful story of the paratroops.

A New Perspective

"OFFICE WORK AND AUTOMATION," by Howard S. Levin (John Wiley & Sons, 204 pages, $4.50).

Mr. Levin writes about a subject that will be receiving more and more attention. He provides a basis on which management can organize an effective program for information purposes. Accountants, researchers, and statisticians will be expected to know and understand these techniques for proper application. Office work is changing, and men and women must keep aware of modern trends and ideas.

The author states that an office is many things, but broadens the office concept to mean a source and product of information. Information is further defined as data collecting, distribution, forming policy, controlling activity, and making decisions. Each are analyzed in a non-technical manner as to terms, fundamentals, and potentials.

Five-channel punched paper tape is discussed as a common language for office operations, as well as other machines that suggest similar procedures. The various kinds of electronic computers are outlined and their effect on office operations.

Mr. Levin believes that a scientific approach is needed to problems of administration. Scientific knowledge is closing the gap between the businessmen and the scientists. Scientific appraisal should not be confused with perfection but rather applied to investigation, research, and specific techniques.

While it is too soon in the history of many of these tools to have complete appraisals of their importance and potential, Mr. Levin does observe many important effects that are being noted in offices today. Mechanization is a general trend in which work is given to machines and used for automatic control. A desire to spend time, money, and effort in new methods will result in modern operations, and "Office Work and Automation" shows the way.

Prophecies and Forecasts

"THE NEXT FIFTY YEARS OF FLIGHT," as visualized by Bernt Balchen and told to Erik Bergaust (Harper & Bros., 214 pages, $3.00).

The prediction of Colonel Balchen which pertain to the Armed Forces:

Small, individual portable helicopter units will be used as well as giant helicopters for division transportation.

Convertiplanes are the plane of the future, requiring no airport, ideal for fast evacuation, embarkation, transports, cargo planes, where no airport is available.

Seaplanes will boost naval strength with squadrons of fighters and water-based bombers.

Atomic-powered rocket planes for the navy are visualized that will fly and then dive into the water to chase submarines below the surface.

Halfway around the equator in two hours and in glass planes.

Photo reconnaissance flights over enemy territory will be accomplished without pilots.

25,000 mph will be the top speed for flying except for military aircraft and with a pilot.

Many military missions will be done with no pilot, but with a guided missile.

Eventually flights will be controlled by electronic brains.

In the next half century a space station will be established on the moon, and landings will be made on Mars.

Background for Understanding

"SOVIET IMPERIALISM," by G. A. Tokaev (Philosophical Library, 73 pages, $2.75).

The Editors have this to say in presenting the value of the material contained in "Soviet Imperialism."

"The threat of a possible Third World War makes the problem of the strategy and tactics of the USSR one of the greatest interest. So far, however, little which is based on factual material has been published on this subject. It is for this reason that this essay has been compiled from a number of lectures and papers already published, or in course of preparation for a larger work, by Engineer Colonel G. A. Tokaev."

"The value of this material is evident from the fact that the author himself assisted for nearly fifteen years in the formulation and practical application of most of the fundamental military and military-technical doctrines of the USSR. As engineer, as theoretical scientist and as aerodynamics expert, Col. Tokaev occupied since 1940 a series of increasingly important technical posts in Soviet aircraft production; and he was serving in 1948 in Berlin as Soviet expert on jet and rocket problems when he decided to cross over, with his family, to the west."

"It should, however, be pointed out that his work is but an epitome and therefore cannot pretend to render accurately or fully Colonel Tokaev's original conceptions. Passages dealing with Soviet military-political and military- philosophical doctrine have been deliberately shortened and simplified so as to give the average reader an understanding of the fundamentals trends of Soviet strategy and tactics, without going too deeply into the doctrines on which these are based."

Into The Blue Goes Who

"STUDIES FOR STUDENT PILOTS," by Michael Royce (Philosophical Library, 282 pages, $6.00).

This is a small but mighty book. Between the 282 pages is given a complete and thorough study of the five basic aeronautical subjects that anyone planning to fly an airplane must master. No more is flying considered just for the professional, but across the country a rising trend is noted for men and women learning to pilot airplanes for other reasons than commercial or as a career.

Meteorology, the science of the weather, and yet not an exact science, is explained in common sense terms. "Sight must never be lost of the extremely delicate interaction of the pressure, temperature and humidity factors . . . proper value and implication must always be given to the words "average" and "tendency." The first section of the

book deals with the fundamental physics of meteorology.

The chapter on theory of flight and airframes deals with air-flow, force, wings, equilibrium, controls, stability, and other theories of aerodynamics.

"Navigation is the art of finding one's way from one part of the earth's surface to another." Certain principles are accurate departures, competent map reading, flying at a steady speed and height, and regarding the watch as an important factor along with other instruments.

A summary is given of instruments and piston-type aero engines to complete this absorbing study.

"THE GIRL HE LEFT BEHIND, (or All Quiet in the Third Platoon)," by Marion Hargrove (Viking, 191 pages, $2.95).

The author of "See Here, Private Hargrove" has written another amusing, sparkling glib story of sergeants, privates, and barracks life.

"SEAWAR, 55" by Felix Riesenberg, Jr. (Rinehart, 320 pages, $5.00).

The story of the U. S. merchant marines in World War II by a man who is well qualified to know the accurate details.

"THE FORD FOUNDATION: THE MEN AND THE MILLIONS," by Dwight Macdonald (Reynal, 186 pages, $3.50).

"An unauthorized biography" of the Ford Foundation, describing the largest of its kind, written with clarity and originality.

"APPLIED AUTOMATION," edited by James Custer (Chilton, 235 pages, $6.00).

The absorbing progress of the continuous automatic production line, with applications that will have important implications in the future of everyone.

"AIRCRAFT PRODUCTION METHODS," by Gordon B. Ashmead (Childton, 293 pages, $7.50).

A complete collection of aircraft methods, plane designs, and developing the design into production.

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"ELECTRONIC DATA PROCESSING FOR BUSINESS AND INDUSTRY," by Richard Canning (John Wiley & Sons, 332 pages, $7.00).

The complete answer to what is electronic data processing. This book categorizes electronic data processing as regular capital equipment which can be used for an effective course of action.

"THIS IS OUR WORLD," by Louis Fischer (Harper, 522 pages, $5.00).

A survey of the happenings today in the international affairs, by a veteran foreign correspondent.

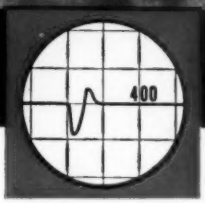
Gruen Precision Laboratories was formed last month in Cincinnati to engage in the engineering and development of precision products for national defense and industrial application.

The Matador was the first missile to be ordered into production, and the first missile to be placed on operational duty by Air Force tactical missile squadrons in Germany.

• The Army's aim is not merely to wreak destruction upon an enemy but actually to conquer him—which is the ultimate wartime goal of all military action.

First in Constant Speed Drives...

SUNDSTRAND



Sundstrand Constant Speed Drives foster new electrical concepts in B-47E

New concepts of an aircraft electrical system, as demonstrated by the startling improvement in the B-47E over earlier models, can be attributed in great part to the Sundstrand Constant Speed Drive. Stable electrical power—availability of 80 KVA from the *first automatically paralleled alternators used in a production airplane*, plus close control of frequency and voltage—brought new reliability and new effectiveness to the Auto-Pilot and "K" Bombing System. These automatic navigation, identification, and bombing systems now operate at optimum level, increasing the B-47E's effectiveness as a modern weapon. A Sundstrand-driven electrical system can help solve *your* problem—write us.

New Electrical Horizons . . .

are opening to design engineers, through co-operation between engine and airframe manufacturers and Sundstrand. With this new concept in electrical systems, expect remarkable advances in operation and performance of tomorrow's aircraft.

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Division of Sundstrand Machine Tool Company, ROCKFORD, ILLINOIS Western District Office: Hawthorne, California

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